

557
Xs
1939

Geology.

Shreveport, Louisiana

Guide Book

Fourteenth Annual Field Trip **Shreveport Geological Society**

June 2nd, 3rd and 4th, 1939

LIBRARY OF THE
JUN 21 1973
UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

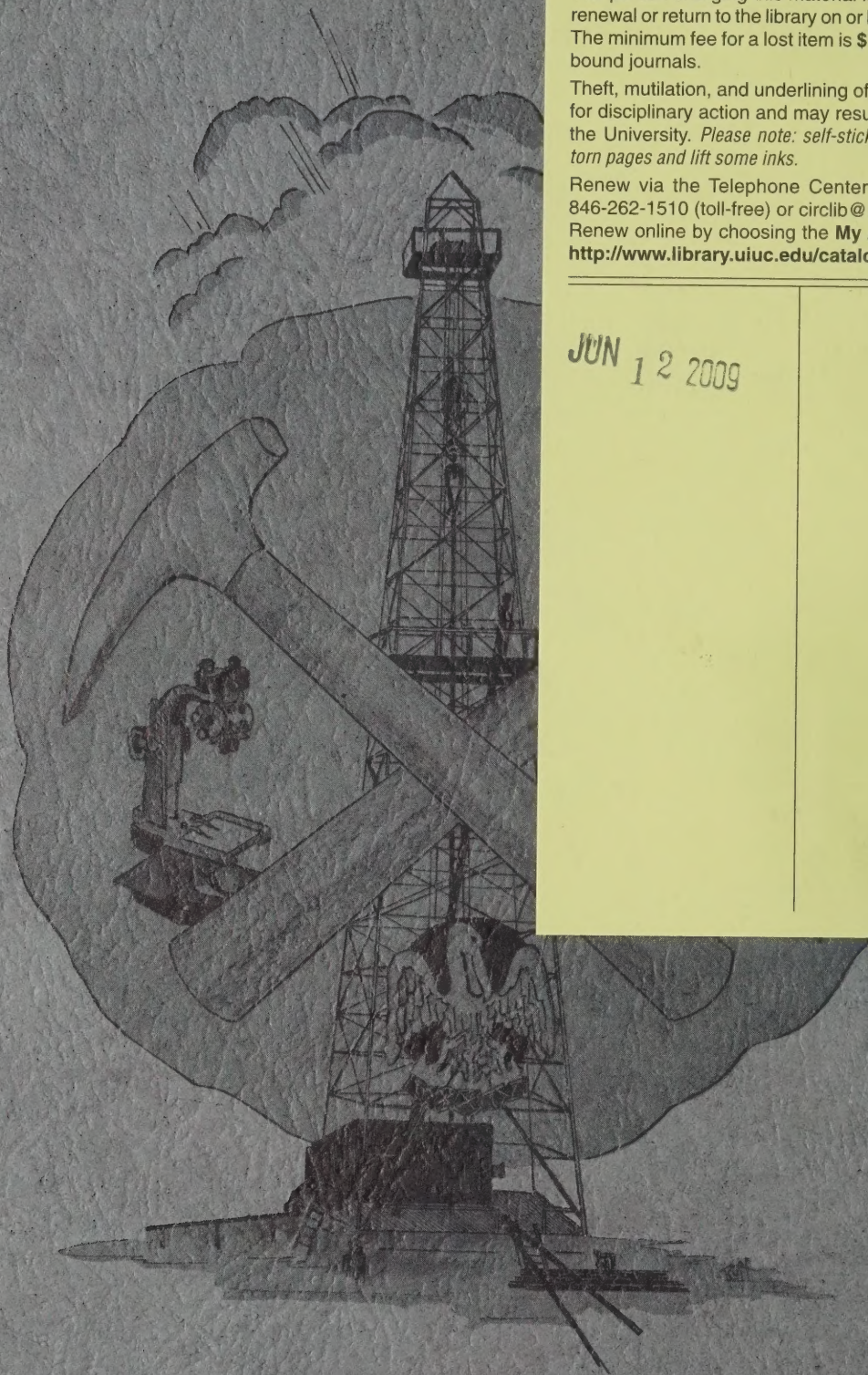
JUN 22 1973

Upper and Lower Cretaceous *of* Southwest Arkansas

GEOLOGY

Supplemented by

Contributions to the Subsurface Stratigraphy
of South Arkansas and North Louisiana



Shreveport Geological Society

1939

UNIVERSITY LIBRARY

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The person charging this material is responsible for its renewal or return to the library on or before the due date. The minimum fee for a lost item is **\$125.00, \$300.00** for bound journals.

Theft, mutilation, and underlining of books are reasons for disciplinary action and may result in dismissal from the University. *Please note: self-stick notes may result in torn pages and lift some inks.*

Renew via the Telephone Center at 217-333-8400, 846-262-1510 (toll-free) or circlib@uiuc.edu.

Renew online by choosing the **My Account** option at: <http://www.library.uiuc.edu/catalog/>

JUN 12 2009

25
Xs 7

Shreveport Geological Society

Officers:

<i>President</i>	C. C. CLARK Union Producing Company
<i>Vice-President</i>	L. S. HARLOWE Grogan Oil Company
<i>Secretary-Treasurer</i>	E. F. MILLER Oliphant Oil Corporation

Committee in Charge of Field Trip:

W. B. WEEKS, Phillips Petroleum Company.....	<i>Chairman</i>
R. T. HAZZARD, Gulf Refining Company.....	<i>Vice-Chairman</i>
C. L. MOODY.....	The Ohio Oil Company
W. K. LINK.....	Standard Oil Company of Louisiana
H. H. TRAGER.....	The Atlantic Refining Company
L. W. CALAHAN.....	The Texas Company
W. D. FRAZELL.....	Union Producing Company
E. F. MILLER.....	Oliphant Oil Corporation

Committee Members in Charge of Various Activities:

- R. T. HAZZARD: Measuring and sampling outcrop sections, logging route.
- C. L. MOODY AND R. T. HAZZARD: Coordination and editing papers, publishing folio.
- L. W. CALAHAN: Preparation of fossils, slides and core specimens.
- W. D. FRAZELL: Arrangements for transportation, meals, accommodations, baggage, and general management of trip.
- W. K. LINK AND H. H. TRAGER: Survey of similar publications and trips of other organizations to obtain suggestions for our trip and publication.
- E. F. MILLER: Publicity and advertising.
- for



Shreveport Geological Society

1939

557
X3

Shreveport Geological Society

Officers:

President.....C. C. CLARK
Union Producing Company

Vice-President.....L. S. HARLOWE
Grogan Oil Company

Secretary-Treasurer.....E. F. MILLER
Oliphant Oil Corporation

Committee in Charge of Field Trip:

W. B. WEEKS, Phillips Petroleum Company.....*Chairman*

R. T. HAZZARD, Gulf Refining Company.....*Vice-Chairman*

C. L. MOODY.....The Ohio Oil Company

W. K. LINK.....Standard Oil Company of Louisiana

H. H. TRAGER.....The Atlantic Refining Company

L. W. CALAHAN.....The Texas Company

W. D. FRAZELL.....Union Producing Company

E. F. MILLER.....Oliphant Oil Corporation

Committee Members in Charge of Various Activities:

R. T. HAZZARD: Measuring and sampling outcrop sections, logging route.

C. L. MOODY AND R. T. HAZZARD: Coordination and editing papers, publishing folio.

L. W. CALAHAN: Preparation of fossils, slides and core specimens.

W. D. FRAZELL: Arrangements for transportation, meals, accommodations, baggage, and general management of trip.

W. K. LINK AND H. H. TRAGER: Survey of similar publications and trips of other organizations to obtain suggestions for our trip and publication.

E. F. MILLER: Publicity and advertising.

done covered

Your **G.S.I.** *Crew*

Our laboratories are prepared to make analyses of soil samples for all significant constituents of value in exploring for oil and gas fields.

SOIL SURVEYS

GEOPHYSICAL

IS BACKED BY 150 CREW YEARS OF SEISMIC REFLECTION
EXPERIENCE IN THE UNITED STATES AND ABROAD

This view shows only part of the precision equipment
used in our Dallas Laboratory to construct the finest
seismograph equipment available in the industry today.

REFLECTION SEISMIC SURVEYS

SERVICE INC

EUGENE McDERMOTT
PRESIDENT

H. B. PEACOCK
VICE PRESIDENT

J. E. JONSSON
SECRETARY & TREASURER

DALLAS,
TEXAS

FOREWORD
BY
C. L. MOODY

The Shreveport Geological Society welcomes you on its 14th Annual Field Trip. The route chosen for this year's excursion is intended to include representative outcrops of all the Mesozoic formations of southwestern Arkansas. It is hoped that the experience of viewing the strata in an area made classic by the labors of such earnest scientists as Taff, Hill, Branner, Veatch, Miser, Stephenson and Dane will be memorable and that the study of the buried extension of the beds here exposed, the problem with which most of us are directly concerned, will be resumed with new vigor inspired by direct, concrete contact with that which in our usual routine is necessarily viewed largely in the abstract.

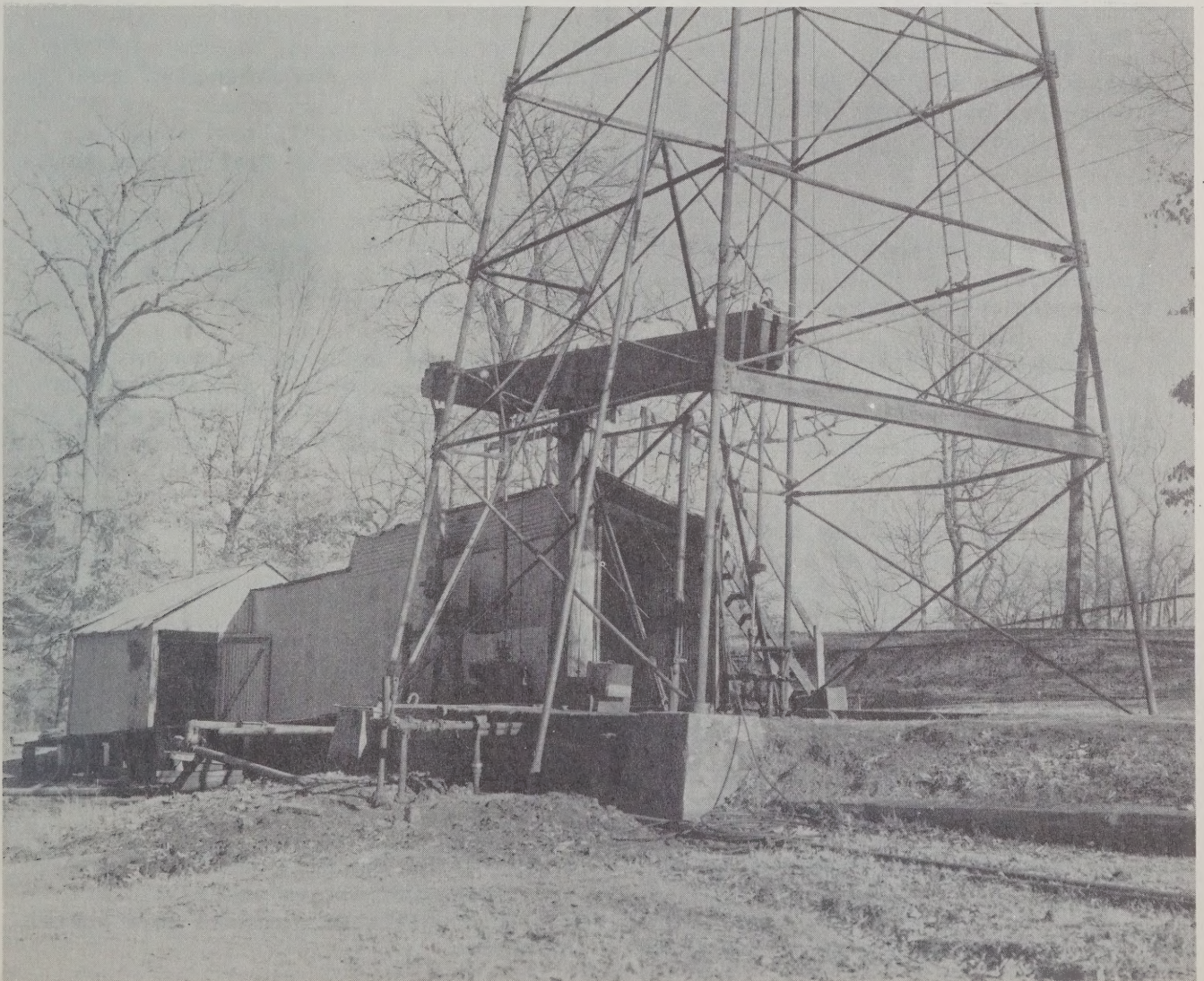
Considerable diversity exists in the possible geologic observations which may be made on the itinerary of the present excursion. To the geomorphologist will be especially impressive the direct control which the resistant gravel beds, interstratified with the Cretaceous sands and clays, exerts on the development of land form. The cuesta in a humid climate is here well exemplified and presents unusual opportunity for study. Major and minor stream patterns lend interest to those who are physiographically minded. The sedimentationist will be intrigued by the facies changes observable in the Tokio formation, and, if from Texas, will possibly be inclined at first to dissent from the view that these beds represent the classic Austin chalk. Paleontologists will find the marls, chalks and some of the sands replete with their favorite fossils. Petrographers will be pleased with the array of rock types enclosed in the basal Upper Cretaceous tuffs. Stratigraphers will be able to fortify their philosophic arguments by judicious application of their own type of field technique. Evidence of strand line fluctuation, the elusive prize of the palaeogeographer, may be obtained with a minimum of effort. And the rank and file "Rock-buster" will not lack material with which to have his way.

Many new facts have been brought to light by the study of samples furnished from the deep wells of southern Arkansas and northern Louisiana. Some of these facts have been interpreted and correlated by all of the workers engaged in geologic problems in the Ark-La-Tex Area. As may be expected in a field where new evidence is appearing daily, opinions differ among individuals on matters of detail if not on questions of fundamental significance. The papers, maps and sections which follow should be accepted as embodying the interpretations of the facts in possession of the individual authors. In sponsoring this publication the Shreveport Geological Society proudly proclaims the desire to assist in the dissemination of scientific knowledge and to support the doctrine of free speech for geologists.

The technical contributions which are included in the present guidebook have been prepared to assist in presenting as clearly and concisely as possible a general view of the Mesozoic geology of the northwestern portion of the Gulf Coastal Plain. In viewing the Cretaceous outcrops in Arkansas one should bear constantly in mind that he is inspecting only the attenuated edges of very extensive rock layers which thicken and expand southward under cover in an impressive manner that could not be predicted from surface observations. Furthermore the older formations of the Coastal Plain sequence do not outcrop at all; they are known only in deep well samples. Only a few hundred pounds of Smackover limestone have been seen by human eyes yet many of us are at least distantly familiar with its characteristics. Samples larger than standard core barrel

practise yields have not been available to make possible the complete portrayal of the features of the thick shales and associated sands of the Cotton Valley formation. Two thousand feet of red sands and shales found in the oil fields of Louisiana are not certainly known to outcrop in Arkansas though they are probably represented by thin clays and sands which appear below the Dierks limestone. The Holly Creek red clays and sands become marine shales and limestones further south. The thin gypsum beds seen in the DeQueen limestone are of exceptional significance because they represent the Glen Rose anhydrite zone. The lithologic distinctness of the anhydrite and its outstanding characteristics in electrical logs have greatly simplified structural studies of the buried Comanche rocks. The tuffaceous conglomerate which evidences the unconformity between the Upper and Lower Cretaceous series in Arkansas is not found on the higher part of the Sabine Uplift. The Comanche-Cretaceous unconformity in the vicinity of that important structural feature lies at the base of the Tokio.

These and many more related facts are set forth in the papers which follow. It is desirable that the articles be studied concurrently with the field observations. By following this course a fairly complete visualization of the geology of an important sector of the Gulf Coastal Plain may be anticipated.



PINE ISLAND OIL FIELD
CADDO PARISH, LOUISIANA
BY
A. F. CRIDER (1)

LOCATION & HISTORY

The Pine Island Oil Field was developed as a northeast extension of the old Mooringsport-Oil City Field, from which it is separated, structurally, by a low saddle. The first oil well was completed during 1917 by the Elton Oil Company on the Hobbs lease, in section 21, T21N, R15W. Initial production of 150 barrels from the "Woodbine" sand was obtained at an approximate depth of 2300 feet.

The development of the Pine Island Field took place long after the Mooringsport, Trees, Caddo Lake, and Oil City pools were opened. It stands out as a separate pool from the others mentioned and was discovered by the venturesome wildcatter who had ignored the few dry holes which had been drilled northeast beyond the limits of production of the Oil City pool.

After the "Woodbine" wells began to show signs of exhaustion, many were deepened. A then new producing zone was discovered between depths of 2800 and 2900 feet, stratigraphically below the base of the massive Glen Rose Anhydrite.

The Pine Island Field proper embraces about 7600 acres in the east central part of Twp. 21N-Rge. 15W., Caddo Parish, Louisiana. Two small areas of production extend across into Range 14W.

PRODUCING FORMATIONS
CHALK ROCK

The shallowest and geologically youngest horizon to produce oil in paying quantities in the Pine Island Field is the Annona Chalk. Oil production from the Annona Chalk ranges in depth from about 1450 feet to 1700 feet.

During the early development of the Oil City pool whose main production came from the so-called "Woodbine" sand, a few large chalk rock wells were completed. Some of these had initial productions of more than 7,000 barrels per day; but unless the wells blew in while drilling, they were completed in the "Woodbine" sand.

The Pine Island Field has been intensively drilled for chalk rock production subsequently to the decline of the "Woodbine" and Glen Rose production; this production is now practically the only production in the field.

Many of the old chalk rock wells have been acidized with greatly increased production and all recently drilled wells are acidized as soon as completed.

"WOODBINE ZONE"

The second zone to produce oil in the Pine Island Field, in point of depth, was the so-called "Woodbine sand."

There are three distinct zones in the Caddo District Oil Fields from which

so-called "Woodbine" production was obtained. The first and uppermost oil bearing sand is a sandstone near the base of the Tokio formation, immediately underlying a black shale section. This sand is a fairly coarse grained quartz sand which apparently is lenticular in character and of somewhat irregular areal distribution.

The second "Woodbine sand" is the contact zone between the Upper and Lower Cretaceous. In the Pine Island Field where the basal Upper Cretaceous rests directly on Upper Glen Rose Limestones solution of the underlying limestones has developed a secondary porosity. Recrystallization of calcite in the reworked materials of the basal Upper Cretaceous, overlying these limestones, has developed a limey zone which also is porous. Oil production from this contact zone was designated as "Woodbine" production.

The third producing "Woodbine" zone, in reality is a zone of lenticular sands of irregular distribution and variable thicknesses interbedded with greenish gray red mottled claystone and thin fossiliferous limestones. The top of this zone of sands is from 10 to 25 feet below the Upper-Lower Cretaceous contact. These sands are Paluxy (Uppermost Trinity) in age. In addition to the Paluxy oil of the Caddo District, production is obtained in the De Soto-Red River Field, and in the Pleasant Hill Field from sands of the same age.

In the early development of the oil fields of the Caddo District, all oil production from depths of 2200 feet to 2400 feet was called "Woodbine Production." In the Pine Island Field proper, the "Woodbine" production came from the contact zone above described.

Paluxy production from the Oil City and the Trees area and Ferry Lake, has contributed a large portion of the total production of the Caddo District.

In the Vivian area to the west of the town of Vivian, recent drilling activities have developed production in sands of Tokio and of Paluxy ages.

ANHYDRITE ZONE

During the drilling of one of its deep tests on the Dillon property, The Dixie Oil Company encountered such a promising oil show in broken anhydrite that casing was set and the well completed as a producer from the anhydrite. This well was pumped for a number of years before it was deepened to one of the lower zones.

THE "2800" AND "2900" FOOT PAY ZONES

During the early developments of the deeper pays of the Pine Island Field, the "2800" foot and "2900" foot pay zones were extensively exploited; however relatively only a small amount of oil was produced. These porous oolitic limestones which occur immediately below the massive anhydrite are within the Rodessa Member of the Lower Glen Rose formation as now defined. Since the early developments in Pine Island, the porous zones in the Rodessa Member have become economically important as gas and oil producing zones in Northwest Louisiana, Southwest Arkansas and Northeast Texas.

DILLON GAS ZONE

"Dillon Sand" is the name given by the writer to a porous oolitic limestone which occurs in the lower part of the Lower Glen Rose of the Pine Island Field,

at an interval some 200 to 300 feet above the top of the "Travis Peak" formation. This porous limestone was a high pressure gas producing horizon; a high content of water-clear distillate characterized the gas production.

The Dillon Sand of the Pine Island Field represents a northward extension of the upper part of the porous Pettet Limestone, which latter produces oil and gas commercially in the Sligo and Shreveport Fields.

The Dillon Sand occurs in the lower portion of the Pine Island Member of the Lower Glen Rose.

HERNDON OIL SAND

Deeper drilling on the Pine Island Field lead to the discovery of the Herndon oil sand from which most of the Trinity oil of this field was produced.

This sandstone occurs within a few feet of the top of the "Travis Peak" formation and is separated from the fossiliferous shaley limestones at the base of the Lower Glen Rose by several feet of brownish red sandy mudstone. The Herndon sand is a fairly fine, sharp-grained quartz sand, either reddish or gray in color with average thickness of 12-15 feet. The producing area of the Herndon Sand was limited to a few hundred acres on the crest of the dome; flank wells carried salt water in the Herndon Sand.

SANDS OF THE COTTON VALLEY FORMATION

The Dixie Oil Company's Dillon #92 well, located in section 13-21N-15W., was drilled to a total depth of 6357 feet; a sand was encountered between depths of 6099 and 6125 feet and broken sand from 6274 to 6357 feet which tested 200,000 cubic feet of gas and a show of high gravity oil. This sandstone zone corresponds to the sands encountered in the Cotton Valley formation immediately above the Bodcaw Sand of the Cotton Valley Field; it appears that Dillon #92 stopped just short of the Bodcaw Sand.

Pine Island, a major structural feature of northwest Louisiana, with the sands of the Cotton Valley formation still untested holds a place of first importance in the untested territory of Northern Louisiana.

DEVELOPMENTS

Since wells completed in the "2800" and "2900" foot pays did not prove to be very profitable, The Dixie Oil Company, the pioneer in deep well drilling in the Pine Island Field, drilled its Dillon #43 well (located in section 13-21-15) to a depth of 3623 feet from which depth on July 21, 1922, the well blew in as a wild gasser which wrecked the derrick. Estimate of flow was made at 50 million cubic feet of wet gas with high distillate content. Producing horizon was the Dillon Gas Sand.

The completion of this well marked the beginning of deep sand development in Northern Louisiana.

During 1929, the Dixie Oil Company completed its Dillon #92 well at a total depth of 6357, which was then the deepest well in Northern Louisiana. A string of 4-3/4" casing was set at 6104 feet and the well tested 192,000 cubic feet of gas and a showing of high gravity oil. This well penetrated the full thickness of the "Travis Peak" and 426 feet of the Cotton Valley formation.

On the whole, Trinity production was not profitable in the Pine Island Field. In recent years, chalk rock production has been the main production. A program of reworking old exhausted "Woodbine" wells by perforating casing; and the drilling of new chalk rock wells has helped to maintain production.

In addition to the acreage being held by chalk rock production, some 25,000 acres or more, recently have been leased by major companies, independent operators and individuals. All of this acreage is held as protection against the eventuality of a thorough test being made of the sands of the Cotton Valley formation and of the Smackover Limestone.

STRUCTURAL FEATURES

The Pine Island uplift is one of the outstanding structures of Northwestern Louisiana, with a closure of more than 2,000 feet measured on the base of the anhydrite.

The uplift has been so positive in its effects that there are more zones which have actually produced oil in the Pine Island Field than in any other one field in Northern Louisiana. Naturally, therefore, the testing of the Cotton Valley formation and all possible deeper zones is awaited with intense interest and speculation.

OUTLINE OF GEOLOGICAL HISTORY

At the end of Comanche time a general emergence of an area embracing, at least, Northern Louisiana, Southern Arkansas and adjacent portions of Northeast Texas, took place. This whole area was subjected to a long cultural continued period of erosion. Either during late Comanche time, or early during the erosional period following Comanche time, several sharp localized domal uplifts took place in Northwest Louisiana, probably due to deep seated salt movements. Pine Island, Bellevue, and Homer are type examples of these domal uplifts. Erosional truncation over these uplifts was much more complete than in the surrounding areas.

One may go so far as to visualize on the then existing landscape the low topographic features which marked the sites of these sharp domal uplifts. Surely some such topographic feature existed early during the encroachment of the Gulf Cretaceous seas. The secondarily developed porosity in the limestones of the Upper Glen Rose which were exposed eventually by erosion on the Pine Island uplift, may be interpreted as resultant from solution and leaching under sub-aerial conditions. This interpretation of the development of the Pine Island "Woodbine" oil reservoir, at the Upper/Lower Cretaceous unconformity appears to be clearly substantiated.

Throughout the emerged area, the Comanche strata in North Louisiana and South Arkansas were eroded, from the Washita-Fredericksburg group progressively downward in the section as one goes in a northeastward direction from the Pine Island area.

Post-Comanche emergence and erosion were followed by a rather extensive submergence, and encroachment of the Upper Cretaceous seas, in which, the sediments of the Tokio, Brownstown, Ozan, Chalk series, Nacatoch and Arkadelphia followed in orderly succession. The Upper Cretaceous sediments indicate an unstable condition for this period, with deep-water sand deposits, shales, chalks, near-shore Nacatoch sand deposits, ending in the widespread distribution of the fairly deep water deposit of the Arkadelphia shale.

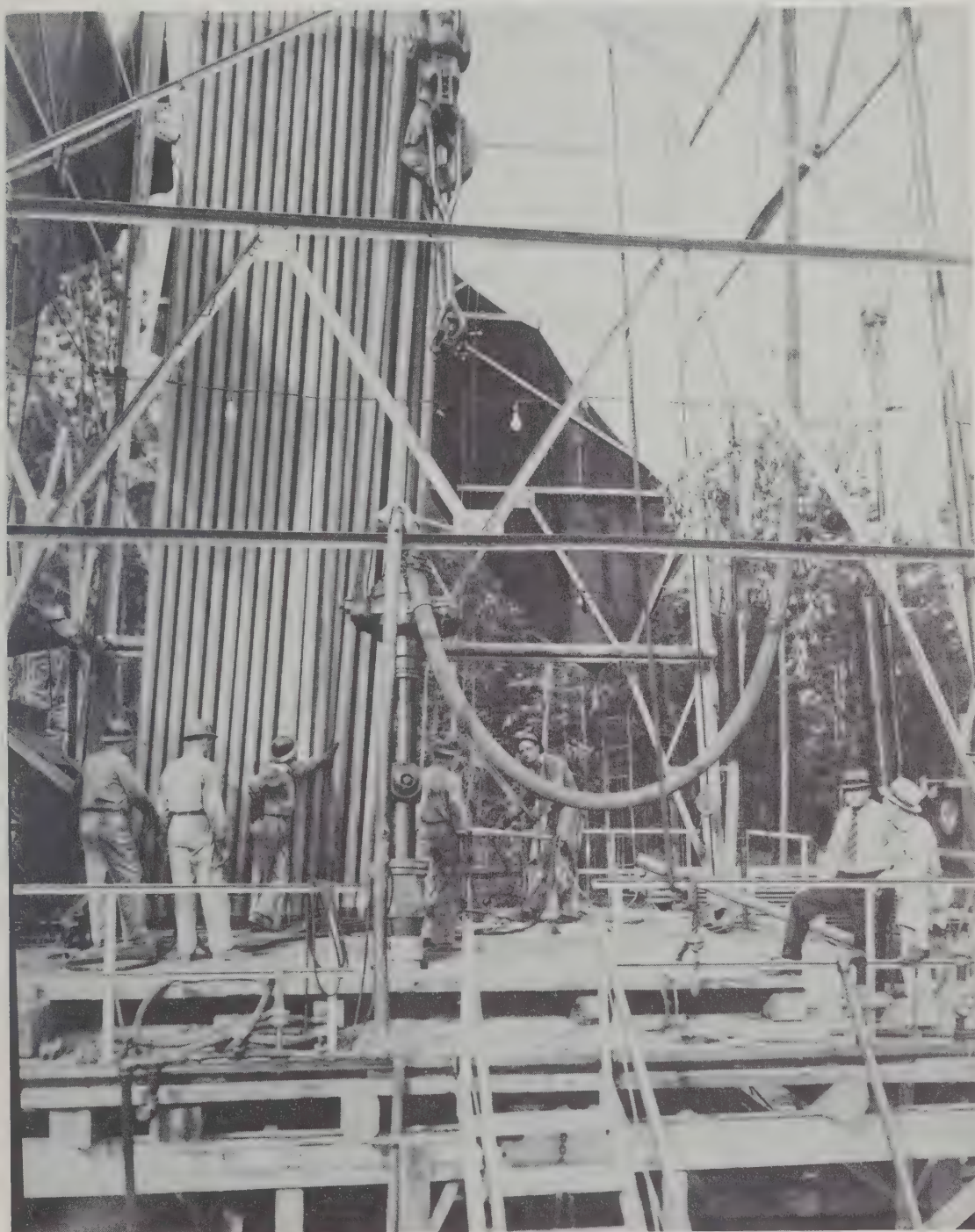
With only a slight time break between the Upper Cretaceous and Tertiary, Midway, Wilcox, and Claiborne sedimentation followed. The northward limits of deposition of the late Eocene and post Eocene Tertiary sediments are conjectural. These sediments at one time probably covered North Louisiana and may have extended into South Arkansas. Slight Gulfward warping and tilting and continuous erosion to the present day brings to an end the historical geological setting of the Pine Island Area.



W. G. Ray Drilling Company, Inc.

Commercial Building

SHREVEPORT, LOUISIANA



Oliphant Oil Corporation, Stewart A-2, Cotton Valley Field, Webster Parish, La.

RALPH DUDNEY

McKAY BUILDING, MAGNOLIA, ARKANSAS

**Drilling Blocks
Proven and Protective Royalties
City Properties**

*Active in Columbia County Oil
Development for past 20 years.*

Office Phone No. 125

Residence Phone No. 250

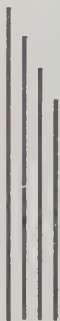
COLUMBIA COUNTY ABSTRACT COMPANY

McKay Building, Magnolia, Arkansas

J. T. STEPHENS, Manager



Telephone 143



MAGNOLIA

County Seat of Columbia County, Arkansas

Welcomes the Oil Fraternity

We have

5,000 People

Good Public Schools

State A. and M. College

Live Progressive Churches

Good Theatres

Enterprising Civic Clubs

A Daily and Two Weekly Newspapers

New Modern Hospital in the Making

*And every thing else it takes to make the type
of town you have been looking for.*

In the heart of the nation's newest and most promising oil producing area, Magnolia is particularly attractive to those in the oil industry preparing to make a permanent home.

MAGNOLIA CHAMBER OF COMMERCE

G. G. MARTEL, Secretary-Manager

MAGNOLIA POOL
COLUMBIA COUNTY, ARKANSAS
BY
H. H. TRAGER

The Magnolia Pool as developed up to the present time, is located in Sections 13, 14, 23 and 24 of Township 17-South, Range 20-West in Columbia County, Arkansas. This area is in the north central part of the Gulf Coastal Plain which is here covered by Claiborne sediments of Eocene age.

Several shallow wells which were drilled in the area between the years 1921 and 1928 had indicated a broad flat structure of low relief in the Upper Cretaceous formations; but none of these wells was productive. After the discovery of oil at Rodessa in the Lower Cretaceous, Elam and Magale drilled a dry hole in Section 13-17S-20W to a total depth of 4018' which stopped in the Lower Glen Rose formation. The discovery of oil in commercial quantities at Schuler, Cotton Valley, and elsewhere in still deeper formations led the Kerr-Lynn Oil Company to drill a well to the Reynolds Lime located in Section 14-17S-20W where seismograph work had indicated a structure in the deeper horizons. The operators were rewarded by bringing in the discovery well through perforations from 7646-49' on April 15th, 1938. Initial production was gauged at 302 barrels of 38 gravity oil per day plus a small amount of salt water. This later proved to be an edge well at the northern limit of production. As of April 1st, 1939, there were 15 oil wells and 3 dry holes which had been drilled to the Reynolds Lime.

The producing formation is the Reynolds zone of the Smackover Lime, the age of which has not been definitely established; but from the meagre fauna collected to date, is assigned to the lower part of the Mesozoic system. This zone, which is about 200' thick, is a soft, white to brown, oolitic and pisolitic limestone with good porosity and permeability. From five to twelve feet of gray, dense, shaley dolomite or dolomitic shale and from ten to thirty feet of dense, brown, oolitic, non-porous limestone immediately overlie the producing zone. The Reynolds zone is underlain by brown, very hard, dense, non-oolitic, or very sparsely oolitic limestone which is also a part of the Smackover Lime.

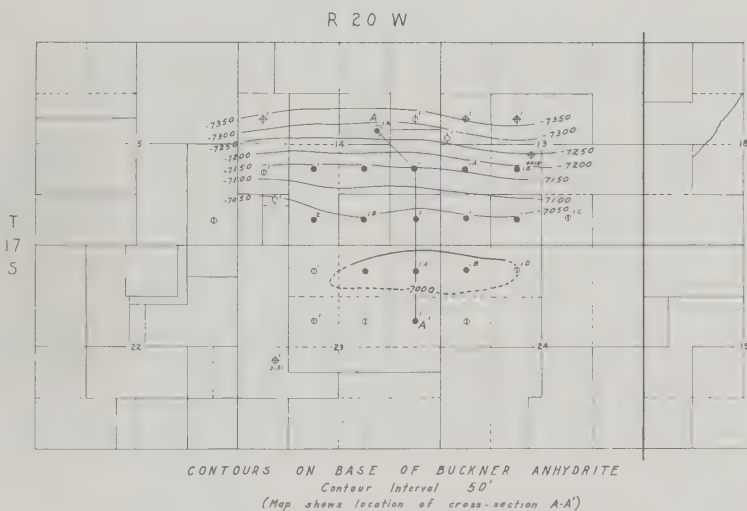
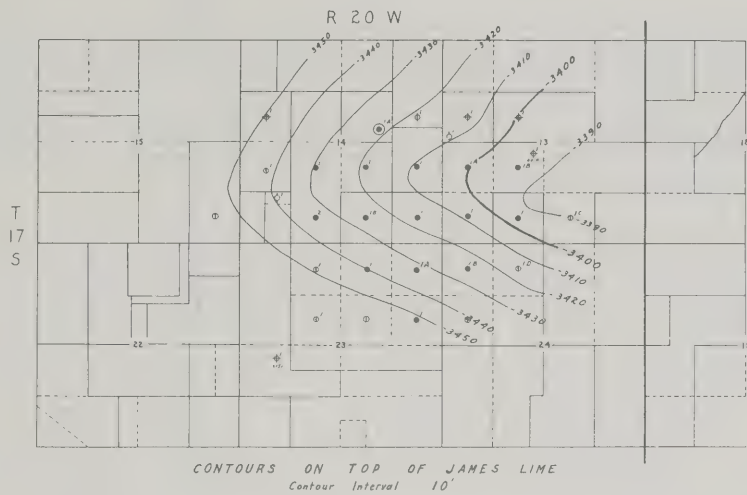
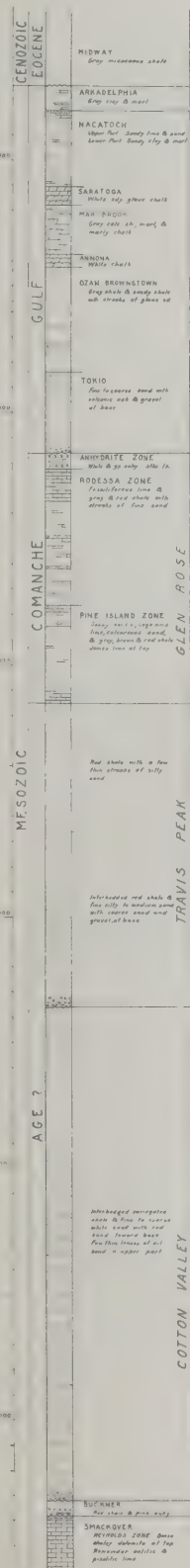
There has been insufficient drilling to outline the structure as to size and shape, but the wells drilled to date show that the Smackover Lime dips northward at the rate of approximately 400' to the mile, and there is over 350' of closure. The field has a gas-distillate cap which is approximately 110' thick, below which is about 190' of oil saturated lime. With a known water drive, the recovery from this structure should be very high.

The pool is considered to be about 20% developed at this time, and there are now 8 rigs running. The spacing has been fixed at 40 acres by the Arkansas Oil and Gas Commission and the daily field allowable for the month of March is 3000 barrels, based 50% upon acreage and 50% upon bottom hole pressure. At the time the field was discovered, the bottom hole pressure was about 3500# and there has been but little drop in pressure since that time. The total production for the field to March 1st was 235,559 barrels, of which the discovery well had produced 78,549 barrels.

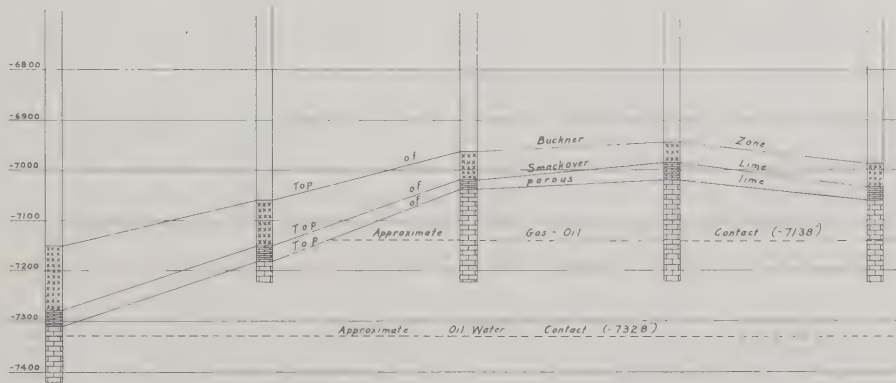
PAGE 15
MAGNOLIA POOL
COLUMBIA CO., ARK.

GEOLOGIC TYPE SECTION

TYPICAL SCHLUMBERGER LOG



ATLANTIC-BARNETT #1 VAUGHN-N. S. GARRETT #1 VAUGHN-LEVI GARRETT #1 NORMANDIE - GARRETT #A-1 ALICE-SIDNEY - CRISP #1



NORTH-SOUTH CROSS-SECTION A-A'

ATLANTA FIELD
COLUMBIA COUNTY, ARKANSAS
BY

K. A. SCHMIDT, WELDON CARTWRIGHT & E. B. STILES

Twelve miles southeast of the town of Magnolia, in Columbia County, Arkansas, Tide Water Associated Oil Company and Seaboard Oil Company completed their J. T. Beene #1 well, located in Sec. 15, Twp. 18S, Rge. 19W, on December 15, 1938, to open another Smackover Lime field. The name Atlanta Field has been assigned to this new discovery. This discovery is credited to a detailed seismograph survey conducted during the early part of 1938.

Oil production is from the Reynolds porous oolitic lime member of the Smackover lime. Top of the Smackover lime was encountered at depth of 8183 feet and the first saturated porous oolitic lime from 8201' to 8226 feet. From 8226' to 8238 feet, dense non-porous oolitic lime was drilled and according to core analyses and Schlumberger electrical log, the top of the second porosity at depth of 8238 feet established the water level. Coring and drilling were continued in porous oolitic lime to a total depth of 8332'. Seven inch casing was set at 8291' and the section from 8212' to 8220' was gun-perforated with 50 shots. First official gauge obtained on December 19th, through a 1/8 inch positive choke on tubing, resulted in 117 barrels of 43.8 gravity oil in 14 hours; Gas-oil ratio 880 to 1; Casing pressure 190C#; Tubing pressure 1475#. On a 1/8 inch and various smaller chokes, Beene #1 produced 2000 barrels and was closed in on January 4, 1939, as no outlet for the oil was available.

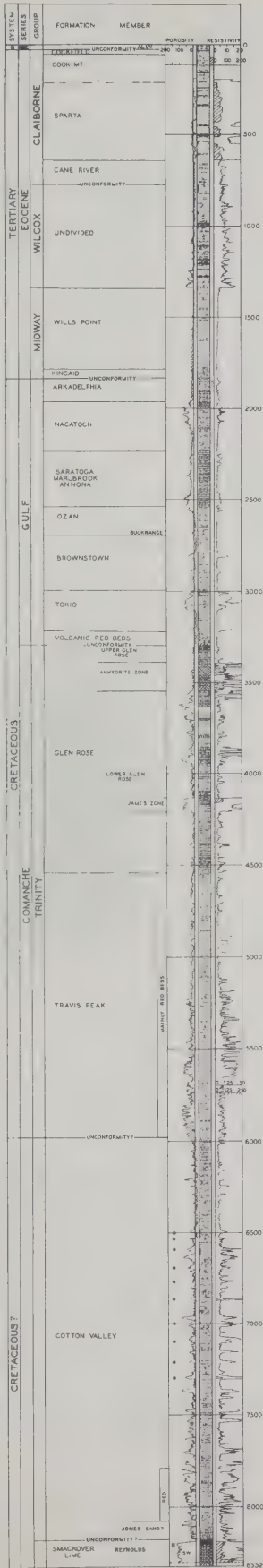
Immediate development includes the drilling of a south offset to the J. T. Beene #1 well, the Tide Water-Seaboard, J. A. Price #1, and the construction of a pipe line to connect with the Arkana Transit Corporation's station west of the Magnolia Field.

Although other wells in southern Arkansas have been drilled through the Smackover lime and into the underlying salt section, Beene #1 is the deepest producing well in Arkansas, and is also the deepest well in total depth. Structurally, it is 3250' lower than Snow Hill, the shallowest field producing from the Smackover lime; and 600' lower than Schuler, which heretofore was the deepest producing field.

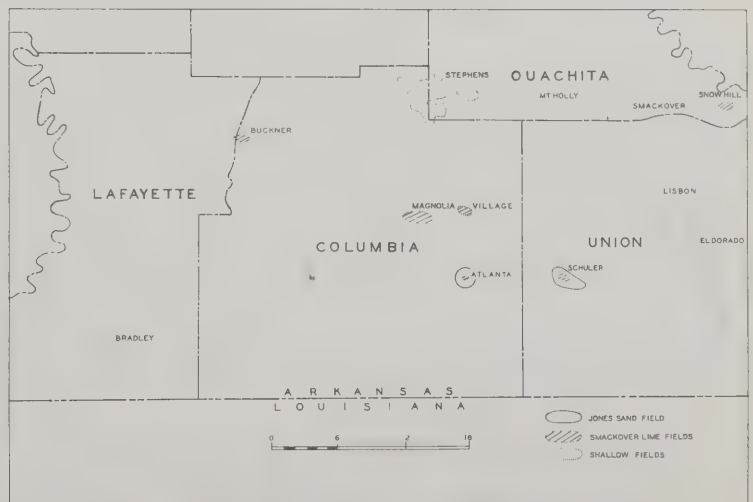
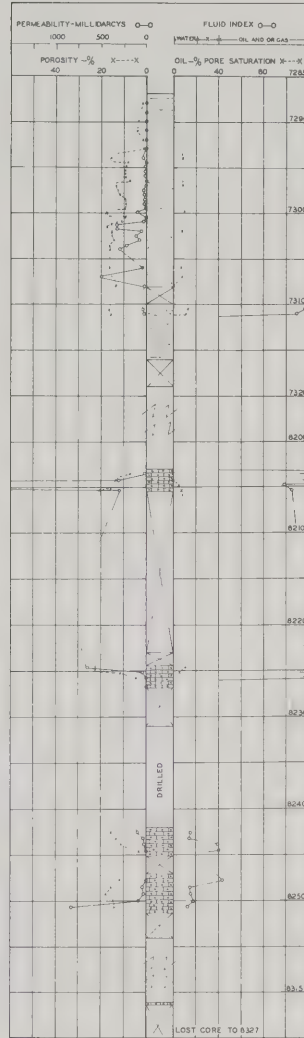
The Gulf and Comanche Cretaceous Series at Atlanta are similar to the sections found in other wells in this general area. The upper part of the Cotton Valley formation consists of variegated shales, grey, red and lignitic shales and thin fine grained sandstones, and apparently is more marine in character than at Schuler, Village or Magnolia. Numerous shows of gas and oil were noted in the thin sands from 6500' to 7300'. Core analyses of cores from one of these sands, the commercial value of which is questionable as it was not tested, is shown on the Schlumberger and Coreograph between depths of 7294' and 7308. The lower part of the Cotton Valley formation is composed of sandstones, coarser grained and thicker than those in the upper part, red to pink and gray in color and interbedded with red and gray shales.

Of special interest is the absence of the Buckner Red Shale and Anhydrite section in the Beene well which section is present in the Magnolia, Village and Buckner fields, and absent at Schuler. The base of the Red Sand section, which overlies the Buckner up dip, is placed at depth of 8080' in the Beene well. The intervening interval of 103' to the top of the Smackover lime is made up of greyish green silty sandy shale, and sandstones which carried a sulphur odor and salty taste. In the stratigraphic section this material occupies the position of the Jones Sand of the Schuler Field.

TYPE SECTION
ATLANTA FIELD
SILURIAN-PALEOZOIC CORES



COREGRAPH
ATLANTA FIELD
TIDE WATER ASSOCIATED-SEABOARD OIL CO.
BEENE NO. 1



COTTON VALLEY FIELD
WEBSTER PARISH, LOUISIANA
BY
C. L. MOODY AND J. D. MOODY

On a gently undulating surface carved in a Pleistocene terrace in northern Webster Parish, Louisiana, stands Cotton Valley. The village of that name is situated on the northwest flank of a most interesting anticlinal structure, but no surface manifestation of the underground geology is seen. All that is known has been learned from a study of the data furnished by the numerous wells that have been sunk in the search for and development of the several gas and oil pools which are there found superimposed one over another.

Buried stratigraphy and structure of the Cotton Valley field are graphically portrayed in plan, cross-section and columnar section in the two plates accompanying this article.

Gas was discovered at Cotton Valley in the Buckrange sand in the summer of 1922. In the fall of 1923 oil was found in the same sand at slightly greater depths surrounding the gas area. A low, elliptical dome was outlined in the course of development of this 2500-foot sand in which the accumulation of gas, oil and saltwater displayed a perfect exemplification of gravitative separation in a uniform reservoir.

Deepening operations in 1926 resulted in the discovery and subsequent development of Glen Rose gas within the anhydrite section, and, in sands immediately below the base of the anhydrite, both oil and gas were found later in commercial quantity. These reservoirs proved to be of limited extent and they were rapidly depleted. Contouring on the base of the anhydrite zone, at this time possible only within the developed Glen Rose area, delineated a dome which, in plan, is quite like that in the Buckrange sand, but, in cross-section exhibits about twice the rate of dip of that in the Upper Cretaceous beds. Surface outcrops of strata in and directly beneath the De Queen limestone in Arkansas stratigraphically represent the productive beds of the Glen Rose in Cotton Valley where they are found at depths between 4500 and 4800 feet.

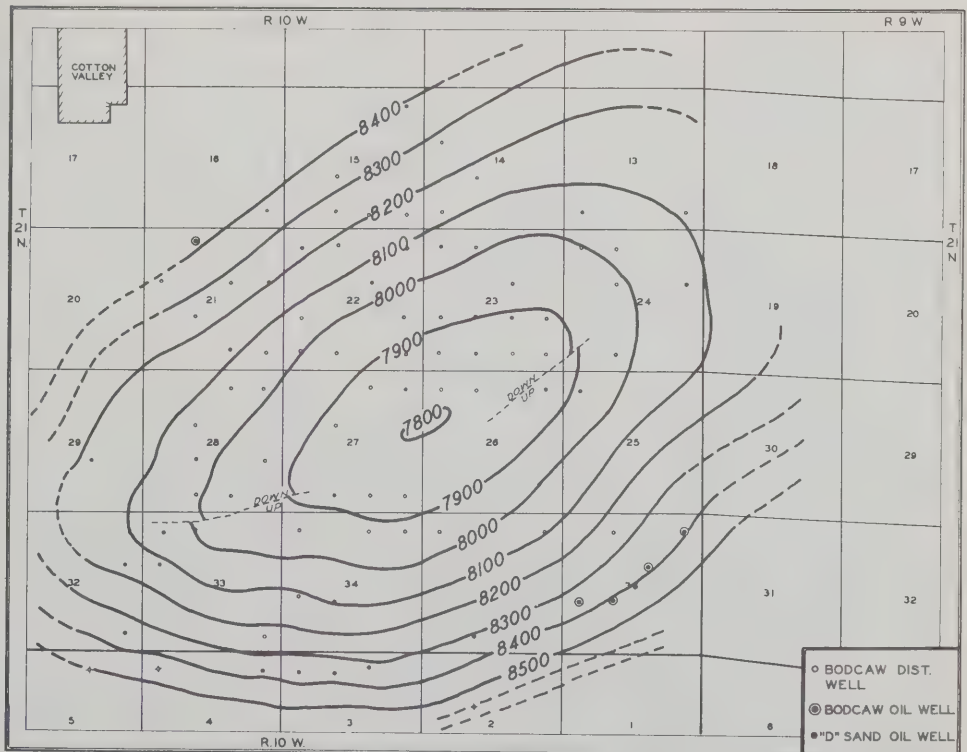
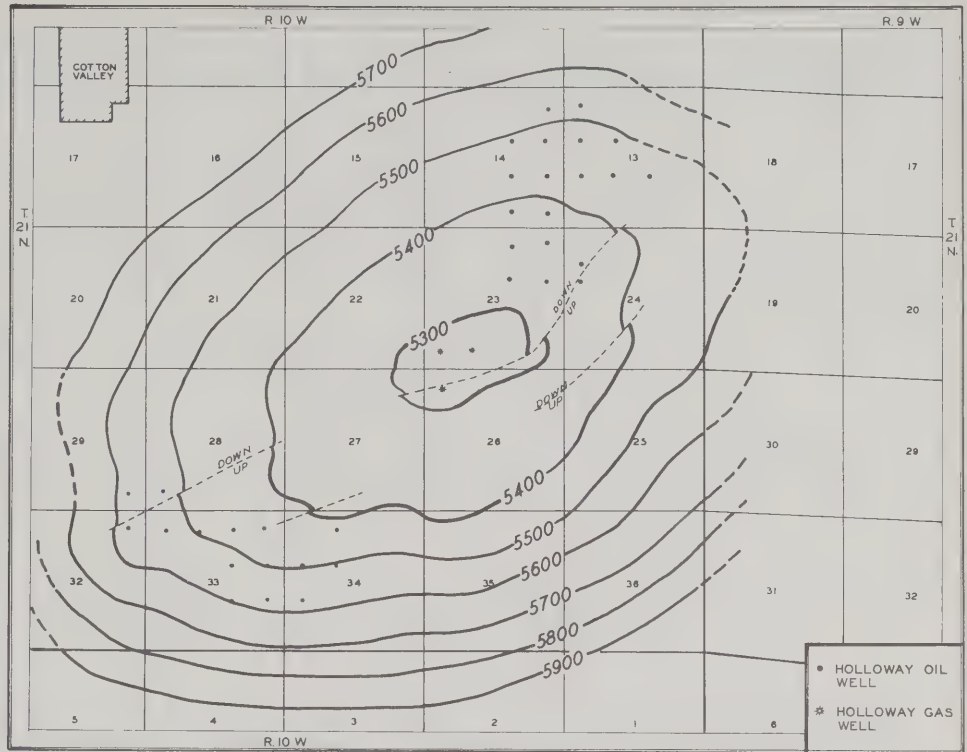
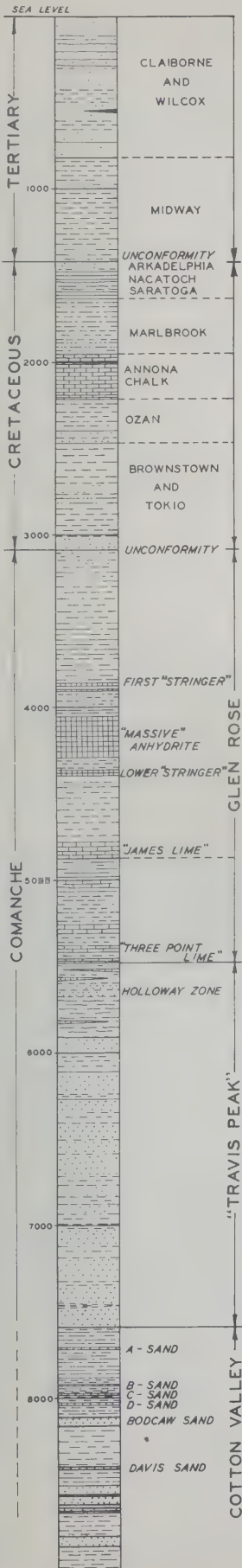
Exploration of the formations underlying the Glen Rose was not undertaken until 1936. Early in 1937 oil sand was found in the top part of the "Travis Peak" formation at a depth of 5540 feet. Further deepening disclosed the existence of at least ten sand bodies interbedded with marine or estuarine black shales which lie below the 2100 feet of continental or palustrine strata at present called the "Travis Peak" formation. These black shales had been previously penetrated in test wells on the Bellevue, Pine Island and Homer domes but no production was obtained from the inter-stratified sands. At Cotton Valley however these sands were found to be charged with fluid laden gas and crude oil, which, at depths of 8100 to 9000 feet, were confined under formation pressures ranging from 3970 to 4400 pounds per square inch. The black shale beds with the interstratified sands have recently been christened the Cotton Valley formation. The upper contact of the new formation is gradational into the red "Travis Peak" beds; the lower boundary is not known with certainty in northwestern Louisiana. In southwestern Arkansas and northeastern Louisiana the Cotton Valley shales lie on red beds and anhydrite now included in the Buckner formation.

Both the "Travis Peak" oil and the deep gas were discovered in one well, The Ohio Oil Company's Holloway No. 6. This well was drilled to a depth of 8556 feet and, after the presence of deep gas was demonstrated by drill stem

test, was plugged back and gun perforated in the first sand of the "Travis Peak" formation where an excellent flow of oil was obtained. Subsequent drilling on neighboring leases soon established the fact that the oil sand in this well is not continuous over the Cotton Valley structure. Productive sands are found at different depths within the upper 250 feet of the "Travis Peak" formation; they are here grouped and designated the "Holloway zone." This sand zone occupies an irregular belt which roughly follows the northeast southwest, or major, axis of the Cotton Valley dome. The distribution of producing wells shown on the "Travis Peak" structure map indicates the limits within which these "red-bed" sands are found. All the 109 deep wells of the field have been drilled through the Holloway zone, but only 35 have found productive sands in the "Travis Peak." A small gas cap surmounts the oil bearing portion of the "red-bed" reservoir and edge water is known on the southwest margin of the dome. Arenaceous strata underlying the Dierks limestone outcrop in Howard and Sevier counties, Arkansas; they are approximately equivalent stratigraphically to the oil sands of the Holloway zone of Cotton Valley. No outcrops of Cotton Valley or older formations of the Coastal plain are definitely known anywhere in the United States; they are thought to be concealed in the area traversed in the present field excursion by progressive overlap of later members of the Trinity group.

Correlation of the Cotton Valley formation remains a major problem of subsurface stratigraphy in the Ark-La-Tex area. Only a small fauna is known from the beds and it has not been sufficiently studied to permit a present guess as to whether or not any standard guide fossils exist therein. Adkins and other workers have suggested that the "Travis Peak" formation is the equivalent of the Las Vigas formation of Mexico. As the "Travis Peak" formation appears to grade downward into the Cotton Valley formation in Louisiana it is possible that the latter beds are also of Las Vigas (Eocretaceous) age. Evidence is accumulating which tends to identify the lower portion of the Glen Rose formation of Louisiana with the type Travis Peak of Texas.

The Cotton Valley dome is an early structure in the Coastal Plain. Before the deposition of the first anhydrite of the Glen Rose formation (Albian) closure of 300 feet had been brought about by vertically directed forces. Progressive structural growth has resulted in a present closure of over 600 feet in the Cotton Valley formation.



ARKMO LUMBER COMPANY

Oil Field Division

Shreveport, Louisiana

Everything in Field and Building Materials.

We are in position to fill your requirements promptly.



Yards throughout the Ark-La-Tex area:

LONGVIEW, TEXAS
TURNERTOWN, TEXAS
CARLISLE, TEXAS

JEFFERSON, TEXAS
SHREVEPORT, LA.
COTTON VALLEY, LA.

RODESSA, LA.
EL DORADO, ARKANSAS
SCHULER, ARKANSAS



Greetings
to
Shreveport Geological Society



Sultana Drilling Co., Inc.

520 Commercial Bldg.

Shreveport, Louisiana

N. H. WHELESS
President

JOHN BEDINGFIELD
Vice-President and Field Supt.

SCHULER POOL
UNION COUNTY, ARKANSAS
BY
WARREN B. WEEKS (1)

LOCATION

The Schuler Field covers portions of 9 sections centering around Sec. 18, Twp. 18S, Rge. 17W, and is located about 18 miles west of El Dorado, in the central western part of Union County, Arkansas. The areal extent of the field on March 1, 1939 was approximately 3100 acres. This figure probably closely approaches the ultimate extent.

HISTORY OF DEVELOPMENT

Following seismograph exploration in 1936, Phillips Petroleum Company and Lion Oil Refining Company drilled the No. 1 Morgan well, located in the SW/4 of section 18, Twp. 18S, Rge. 17W, to a depth of 5,559 feet, 140 feet in the Cotton Valley formation, where it was completed flowing 320 bbl. of 40° gravity oil per day from the upper of a series of productive lenticular sands. Due to the lenticular sand conditions, only 11 wells have been successfully produced from the Morgan zone. These wells have been pumping since early in 1938.

During the latter part of 1937, E. M. Jones et al drilled their No. 1 Marine well in the SE/4 of Sec. 17, Twp. 18S, Rge. 17W. to a depth of 7,615 feet, and completed it, flowing 2500 bbl. of 32° gravity oil per day from a sand which proved to be at the base of the Cotton Valley formation. By March 1, 1939 there were 122 producers from the Jones sand and 3 dry and abandoned wells.

Near the end of 1937 the original discovery well was deepened to 7,688 feet where it was completed for 15,000,000 cubic feet of gas and 600 bbl. of 63° gravity oil from the Reynolds oolite near the top of the Smackover limestone. Later this well was recompleted from the same horizon, flowing 300 bbl. of 38° gravity oil per day. By March 1, 1939, 14 wells had been completed in this zone.

STRATIGRAPHY AND PRODUCING ZONES

The section of strata encountered at Schuler is indicated by the type electric log shown in the attached figure. All Eocene strata from the upper Claiborne down, are represented, as is the full section of the Gulf Cretaceous common to this region. All Comanche strata above the Lower Glen Rose formation are absent due to the regional post-Comanche erosional truncation.

The Cotton Valley formation is composed of essentially "non-marine" sands and variegated shales. The Morgan Zone embraces an approximate 500 foot section of shales and lenticular oil bearing sands, beginning about 140 feet below the top of the Cotton Valley formation. These sands vary from a few feet to 20 feet in thickness. Although there are shows of oil in deeper sands in the Cotton Valley formation, none has been productive except the Jones Sand which lies at the base of the formation, and consists of from 14 to 80 feet of permeable porous oil and gas bearing sand. This sand has a tendency to grade laterally into shale toward the eastern edge of the field. Porosities vary upward to 23% with an average of 17.6%. The Jones sand is separated from the underlying Reynolds oolite by an interval of 10 to 40 feet of interbedded grey shale and

siltstone and 5 to 20 feet of dense impervious limestone.

The thin dense impervious limestone bed at the top of the Smackover limestone is separated from the immediate overlying shale and siltstone by a thin streak of gravel which apparently is persistent over most of the area of the Schuler Field. This gravel probably marks a post-Buckner-pre-Cotton Valley unconformity and it is thought that the Buckner red shale-anhydrite formation (170 feet more or less in thickness) is absent through local post-Buckner erosional truncation.

Beneath the dense lime cap is the Reynolds porous oolite member of the Smackover limestone formation. The porosity of this member varies upward to 19% with an average of 14%. This zone is about 70 to 90 feet thick; some dense limestone lenses are interbedded within the Reynolds oolite. The upper 30 to 50 feet carry oil or gas; the Reynolds oolite is the lowest producing zone in the Schuler Field. The underlying limestone grades from dense oolitic to dense crystalline limestone; 723 feet of limestone have been penetrated in this area.

STRUCTURE

The structure is anticlinal. The attached figure shows structure maps with contours based on three different horizons. Section A-A' is a general north-south cross-section which indicates the structural shifting. Section B-B' is a west-east cross-section through the two lower producing horizons, indicating the structure and the general shaling out of the Jones sand to the east.

The upper map, contoured on the James limestone of the Lower Glen Rose formation, indicates the structure within the Comanche strata. The middle map, contoured on the top of the Cotton Valley, shows the structure to be more or less in accordance with the structure in the underlying productive Morgan zone; and also shows a westward shifting of over a mile as compared to the structure in the Lower Glen Rose. The lower map, contoured on the top of the Jones sand, indicates still further shifting to the west. This westward shifting is also repeated in the underlying Smackover limestone.

Oil production from the Morgan zone is obtained on the northwest flank of the structure and is largely controlled by the lenticular character of the various sands. The oil in the Jones sand is more uniformly distributed; the highest sand point is at a subsea depth of -7251'; original gas-oil contact at about -7270'; and water level varying from -7370' to -7380'. Lack of adequate porosity in the sands has limited production locally along the east and north-east flanks of the field. The Reynolds oolite reservoir is fairly uniform with the highest point at -7360', the original gas-oil contact at about -7394', and the water level varying from -7420' to -7430'.

PRODUCTION

By March 1, 1939, this pool had produced 8,711,530 bbl. of oil from 147 wells; only one well was being drilled on this date.

Morgan Zone Sands:

The 11 pumping wells in this zone, which embraces about 300 acres, had produced 1,552,985 bbl. of oil by March 1, 1939. The gravity on this paraffin base oil averages 41°. The sulphur content varies from 0.49 to 0.52 per cent.

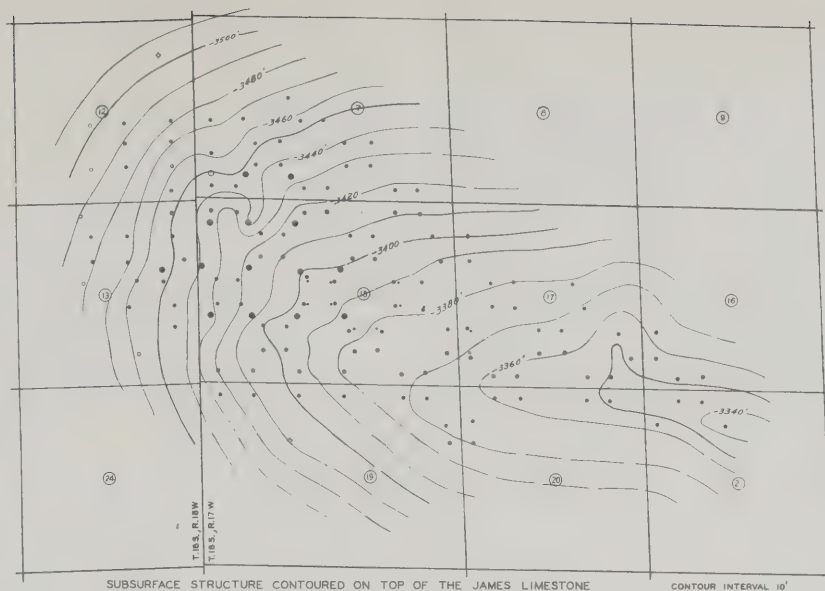
Jones Sand:

On March 1, 1939, this sand had produced 6,584,960 bbl. of oil from 121 flowing wells and one pumper; the producing area of the Jones sand approximates 3100 acres. Bottom-hole pressure had declined from an initial 3520 pounds per square inch to about 2770 pounds per square inch. This paraffin base oil has a gravity of from 32° to 34.6° and a sulphur content of about 1.5%.

Reynolds Oolite:

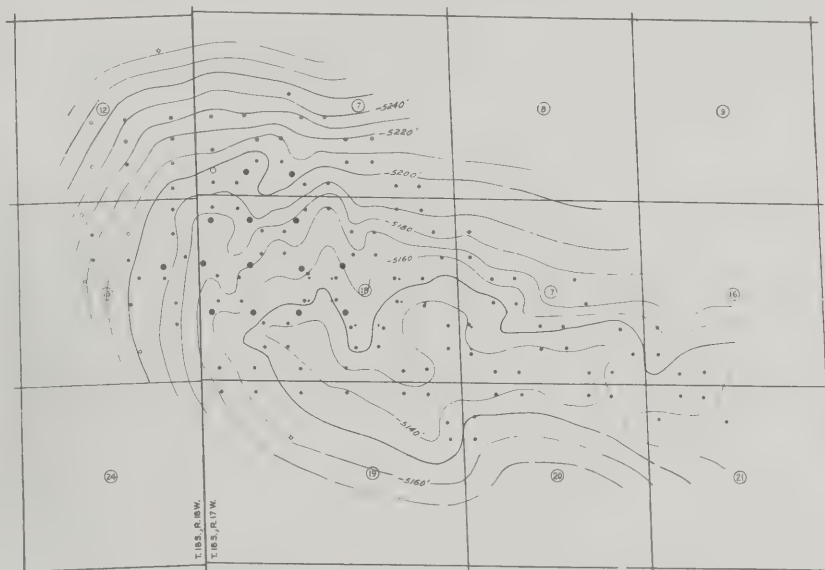
On March 1, 1939, the Reynolds oolite zone had produced 609,585 bbl. of oil from 14 flowing wells; the producing area is approximately 500 acres. Reservoir pressure had decreased from an original 3545 pounds per square inch to about 3405 pounds per square inch. There is a definite water drive which aids in maintaining the reservoir pressure. This paraffin base oil has a gravity of around 37° and a sulphur content of about 9.01%.





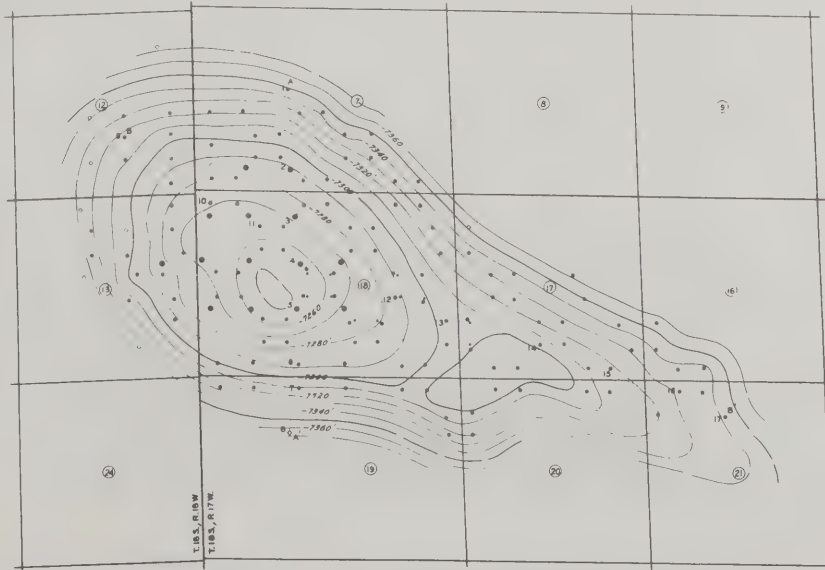
SUBSURFACE STRUCTURE CONTOURED ON TOP OF THE JAMES LIMESTONE

CONTOUR INTERVAL 10^2



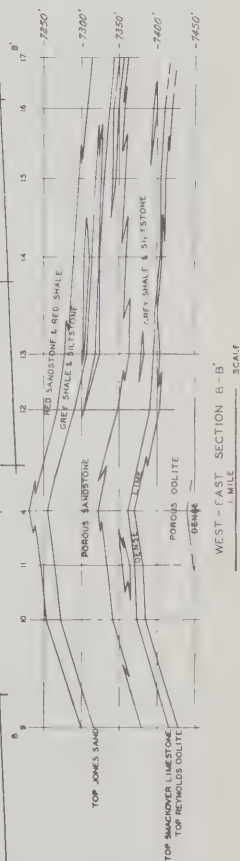
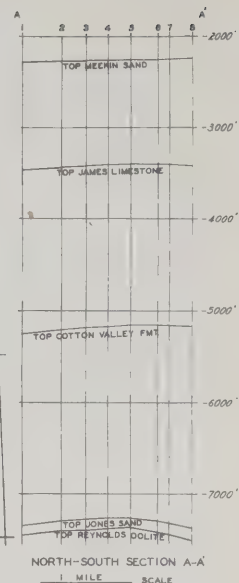
SUBSURFACE STRUCTURE CONTOURED ON TOP OF THE COTTON VALLEY FORMATION

CONTOUR INTERVAL 10^4



SUBSURFACE STRUCTURE CONTOURED ON TOP OF THE JONES SANDSTONE

CONTOUR INTERVAL 10'



MAP LEGEND			
MORGAN ZONE	JONES SAND	REYNOLDS DOLITE	
.	o	o	LOCATION
.	o	o	DRILLING
.	o	o	PRODUCING
.	o	o	DRY & ABANDONED

SCHULER FIELD

UNION COUNTY, ARKANSAS

DRAWN BY WARREN B. WEEKS

SNOW HILL POOL
OUACHITA COUNTY, ARKANSAS
BY
WARREN B. WEEKS (1)

LOCATION

The Snow Hill Pool comprises the Smackover Limestone oil producing area in the west part of Sec. 27, and the east part of Sec. 28, T. 15S, R. 15W. It is located on the northeastern edge of the old Smackover Field in Ouachita County, Arkansas. Actually the Snow Hill Pool should be considered as a deeper extension of the old Smackover Field.

HISTORY OF DEVELOPMENT

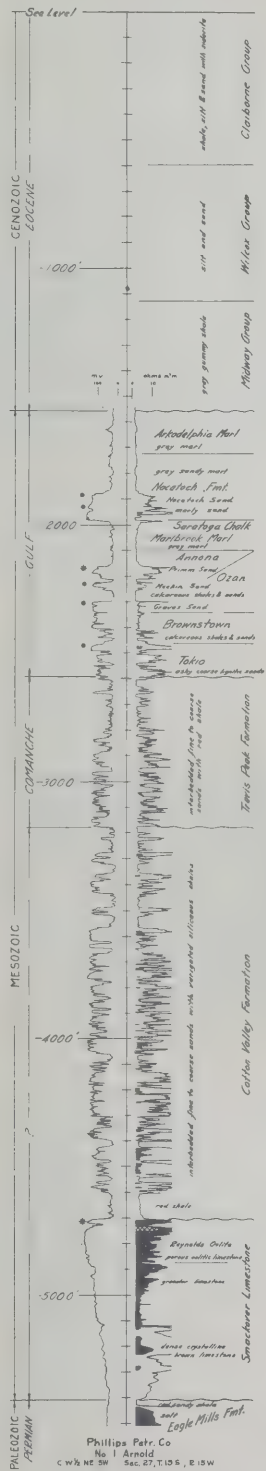
The first deep test for the Smackover area and the first well in the state known to penetrate the Smackover Limestone was the Lion Refining Company No. 9"A" Hayes located in NE SW NE of Sec. 4, T. 16 S, R. 15 W. This well reported a show of oil in the limestone topped at depth of 5220 feet, and was abandoned at a depth of 7255 feet after penetrating 1325 feet of rock salt below the limestone. Base of the salt was not reached in this well.

Subsequent to seismograph explorations carried on during 1935 for determining the deeper structure in this area, the Phillips Petroleum Company drilled its No. 1 Reynolds well located in the SE SE NW of Sec. 27, T. 15 S., R. 15 W. This well found oil and gas in the Reynolds porous oolite, the upper part of the Smackover Limestone, topped at depth of 4897 feet, and was completed for 40,000,000 cubic feet of gas and 180 bbl. of 55° gravity oil per day, on May 8, 1936. In the later part of June, a sudden decrease in gas volume and drop in oil gravity from 59° to 47°, was followed by the appearance of salt water. The well was placed on a pumping basis by September.

Eight other wells were drilled in the immediate area during 1936, and one additional early in 1937. As indicated in the attached figure four of these were initially dry holes, and of the six oil wells, two were abandoned after a few months of production. A well located in the E₂ of SE NE of Sec. 28, T. 15 S, R. 15 W. blew gas out of control for 11 days during August, 1936, and apparently dissipated most of the gas from the reservoir.

STRATIGRAPHY AND PRODUCING ZONE

The section of strata encountered at Snow Hill is indicated by the type electric log shown in the attached figure. The volcanic red bed section at the base of the Gulf series (Center Point Volcanics of Hazzard) is absent by overlap, while all Comanche beds above the Travis Peak formation are absent through pre-Upper Cretaceous erosional truncation. The Buckner "anhydrite" formation, which normally overlies the Smackover Limestone, is absent, possibly due to local truncation since it is present several miles to the west. It is possible that the Snow Hill area may have been an island during Buckner deposition. The shallow producing zones of the Gulf series in the Smackover Field proper are indicated. Occasional shows of oil in sands of the Cotton Valley formation have been encountered. No commercial production has been developed in these sands.



The Reynolds oolite zone consists of porous oolitic limestone (25% average porosity) with a maximum thickness of slightly over 100 feet. It has occasional cellular and granular streaks. Oil saturation was found throughout the Reynolds oolite in the Snow Hill Pool; however, only that portion within 30 to 50 feet of the high point of the structure was free from salt water. The 300 feet of chalky to finely crystalline limestone underlying the Reynolds oolite carried oil stain wherever any slight porosity was developed. The basal 270 feet of the Smackover Limestone, made up of hard, dense, brown and grey, slightly argillaceous limestones, showed oil in fractures, but tested salt water. The Smackover Limestone is underlain by rock salt.

STRUCTURE

The upper map of the attached figure shows the structure of the Snow Hill area contoured on top of the Cotton Valley formation; the lower map shows the structure contoured on top of the porous Reynolds oolite. A slight northward shifting with depth is evident. A north flank well gives evidence of the existence of a normal fault located on the north side of the anticline. The displacement of this fault is approximately 500 feet within the Cotton Valley formation, with downthrow to the north. The displacement is relatively small within the Gulf series, so that the fault is not easily traced in these beds. From the difference in the amounts of displacement in the upper and lower beds, and the increase in the thickness of the Travis Peak on the downthrown side of the fault (Section A-A'), it may be interpreted that most of the faulting took place prior to Gulf Cretaceous deposition.

Section B-B' of the attached figure indicates that the structure on top of the Smackover Limestone does not conform with that within the limestone. The limestone appears to have been rather deeply eroded (100 feet more or less) on the highest part of the structure before Cotton Valley deposition.

It is apparent that there have been several distinct periods of structural movements in the Snow Hill-Smackover areas all of the same general anticlinal type. The major portion of the fault movement was pre-Gulf Cretaceous.

PRODUCTION

On January 1st, 1939, the Snow Hill Pool had produced a total of 132,480 bbl. of oil, most of which had been pumped. The total average production from the four wells producing at that time was 130 bbl. per day. The character of the oil varies somewhat from well to well. Originally some 55° gravity oil was produced, but after the dissipation of the small gas cap, the gravity varied from 32 to 38° in the various wells. The waxy, mixed base oil, has a sulphur content ranging from 0.99 to 1.25 per cent.



A typical "on location" Core analysis service; performed by practical, skilled men who have set an almost unbelievable record for accuracy of interpretations.

WE'VE ANALYZED 29,978 FEET OF CORE . . . 93% CORRECTLY!

Yes, here's a real record . . . out of the 338 wells which we have analyzed, 315 have been interpreted correctly. The reason for such excellent performance is that we know our job from both the practical and scientific standpoint.

In addition to accuracy of interpretation, CoreLab service affords another unique advantage . . . the "derrick floor analyses" provided by modern field laboratories.

These streamlined units have been used in successful analysis work in Texas, Louisiana, Arkansas, Oklahoma, Illinois, Indiana and Kentucky. This service is available to you 24 hours everyday, anywhere in the Mid-Continent, Gulf Coast and Illinois.

Call us at the location nearest you for prompt service



Look for this identification in your telephone directory

CORE LABORATORIES, INC.

General Offices: 708 Santa Fe Building, Phone 2-8952, DALLAS, TEXAS

HOUSTON, TEXAS
Lee Hotel
Fairfax 1157

CORPUS CHRISTI, TEXAS
1410 4th Street
Phones 4752 and 7951

CENTRALIA, ILLINOIS
New Fowler Building
Phone 465

LAFAYETTE, LOUISIANA
106 College Street
Phones 2060 and 1059-W

COTTON VALLEY, LOUISIANA
Gem Hotel
Phone 9104





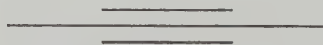
**GUN PERFORATORS • ELECTROLOG • KNUCKLE JOINTS
SINGLE SHOT SURVEY INSTRUMENTS • LINER HANGERS
WHIPSTOCKS AND MILLS • DIRECTIONAL DRILLING
OIL WELL SURVEYS • PACKERS • BRIDGING PLUGS**

212 TRAVIS—SHREVEPORT, LOUISIANA

P. O. BOX 1674—TELEPHONE 2-1545

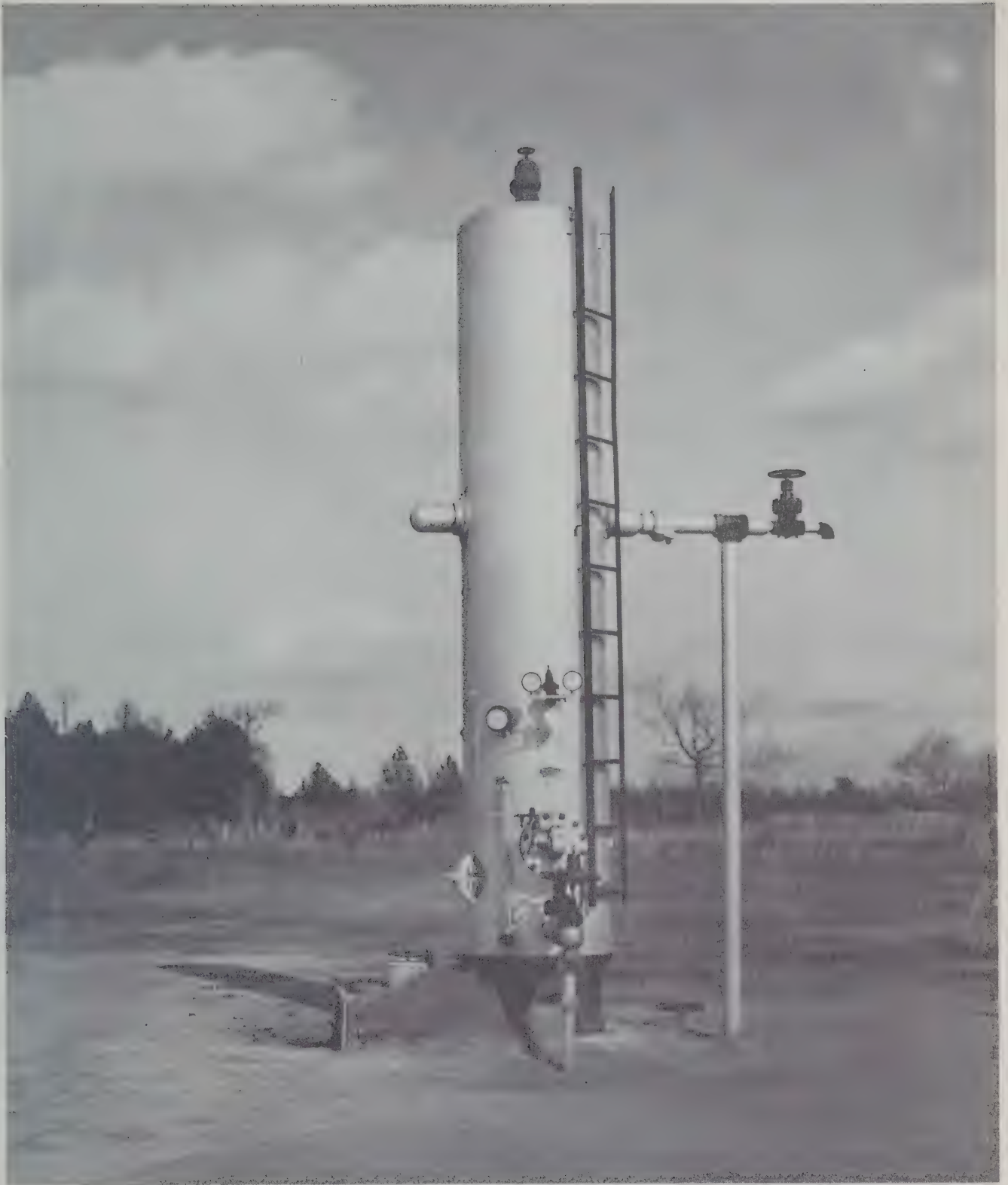
LOS ANGELES • HOUSTON • OKLAHOMA CITY • NEW YORK

BAKER OIL TOOLS, INC.



Huntington Park, California

Houston, Texas



It's a National

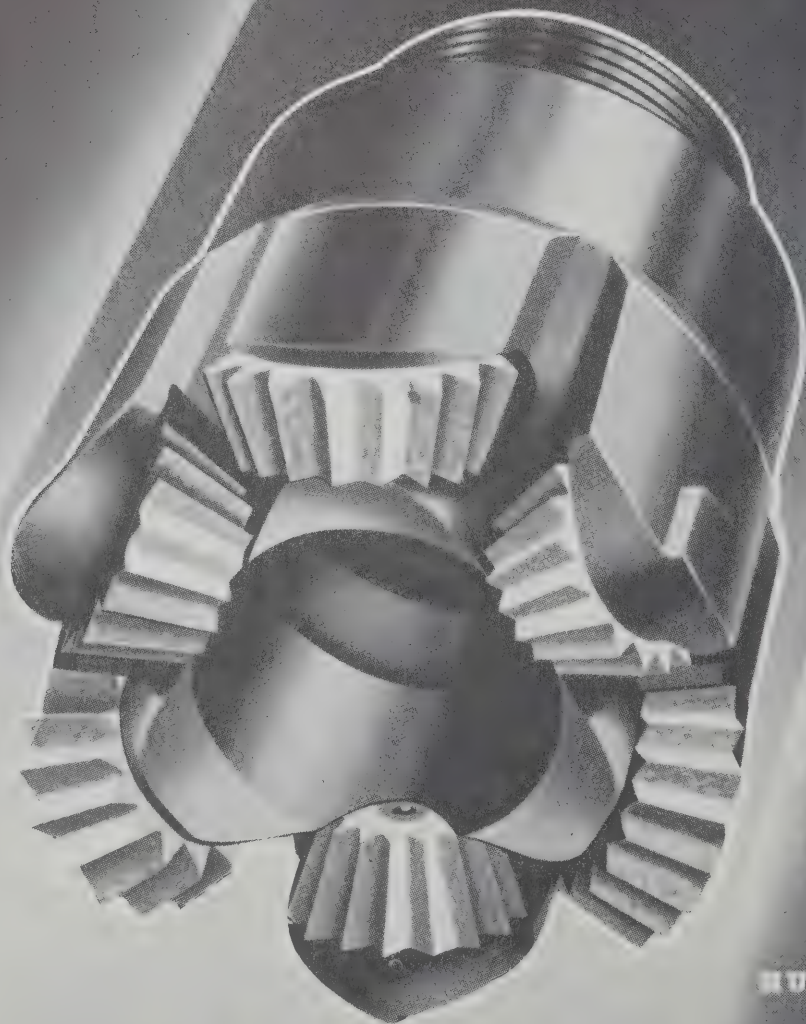
NATIONAL TANK COMPANY
TULSA, OKLAHOMA.

When you need a

CORE

You Get it . . . with a **HUGHES**
CORE BIT !

In drilling deep wells, there comes a time when a large, unbroken, uncontaminated core must be had. Then is when it pays to send down a Hughes conventional Core Bit . . . and "know" when you come out you will have the kind of core you want.

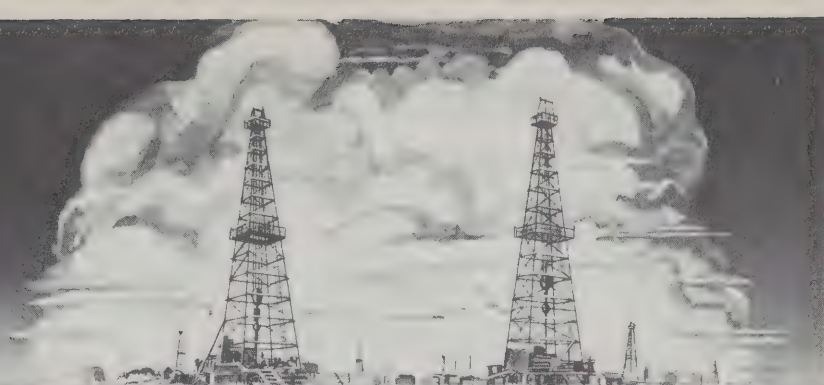


Hard and soft formation cutter heads are interchangeable for varying formations.

HUGHES TOOL CO.
HOUSTON, TEXAS

**Modern
Drilling
Practice**

SAYS:



*Proper weight
at bottom of your
string is the best
assurance of a
Straight Hole -*

That's why more
and more Operators
and Contractors
are using
**Tandem
Drill Collars**
and

NO

YES

Hughes "Tailor-Made" Rock Bits
Built to "take it"

F. H. Brown, Inc.

Drilling Contractors



Ricou-Brewster Bldg.

Shreveport, La.

Compliments of

W. HOLMES SMITH

CAMERON
IRON WORKS

SHREVEPORT, LA.

FOSSIL PLATES
WITH EXPLANATIONS
BY
L. W. CALAHAN

Diagnostic Fossils of the Ark-La-Tex Area

An attempt has been made in the following plates to illustrate most of the important guide fossils of the Ark-La-Tex Area. Many of these illustrations have been copied from plates in bulletins previously published. However, where there was no literature available the fossils were drawn and tentatively named. No attempt has been made to describe any of the forms and references are given for that information where available.

Primarily these plates have been prepared for the use of those working well samples. Therefore, the first occurrence of these forms has been used as a guide in determining the tops of the various formations. Most of the forms have quite a wide range downward from their first occurrence and only a very few of the illustrated fossils are confined to any one definite zone or formation.

PLATE 1

1. *Rzehakina epigona* (Rzehak) x75.....Upper Midway
Fla. Geol. Sur., Bulletin No. 16, page 53
2. *Ammobaculites midwayensis* (Plummer) x75.....Upper Midway
Fla. Geol. Sur., Bulletin No. 16, page 51
3. *Bulimina quadrata* (Plummer) x50.....Midway
Univ. Tex. Bulletin 2644, page 176
4. *Cristellaria subaculeata tuberculata* (Plummer) x25.....Midway
Univ. Tex. Bulletin 2644, page 182
5. *Vaginulina robusta* (Plummer) x25.....Midway
Univ. Tex. Bulletin 2644, page 180
6. *Cristellaria pseudo-costata* (Plummer) x50.....Midway
Univ. Tex. Bulletin 2644, page 182
7. *Cibicides vulgaris* (Plummer) x50.....Midway
Univ. Tex. Bulletin 2644, page 188
8. *Clavulina angularis* (d'Orbigny) x50.....Midway
Univ. Tex. Bulletin 2644, page 174
9. *Cibicides alleni* (Plummer) x50.....Midway
Univ. Tex. Bulletin 2644, page 188
10. *Polymorphina cushmani* (Plummer) x25.....Midway
Univ. Tex. Bulletin, 2644, page 180
11. *Nodosaria radicula* (Linnaeus) x30.....Midway
Univ. Tex. Bulletin 2644, page 176
12. *Nodosaria radicula* (Linne) x50.....Midway
Univ. Tex. Bulletin 3101, page 155
13. *Vaginulina gracilis cretacea* (Plummer) x25.....Arkadelphia
Univ. Tex. Bulletin 2644, page 172
14. *Pseudotextularia* sp. (Rzehak) x75.....Arkadelphia
Univ. Tex. Bulletin 2644, page 172
15. *Dorothea bulletta* (Carsey) x50.....Arkadelphia
Univ. Tex. Bulletin 3101, page 132
16. *Dorothea bulletta* (young) (Carsey) x50.....Arkadelphia
Univ. Tex. Bulletin 3101, page 132
17. *Globotruncana rosetts* (Carsey) x50.....Arkadelphia
Univ. Tex. Bulletin 2644, page 172
18. *Frondicularia reticulata* (Reuss) x25.....Arkadelphia
Univ. Tex. Bulletin 2644, page 172
19. *Pseudotextularia* sp. (Rzehak) x75.....Arkadelphia
Univ. Tex. Bulletin 2644, page 172

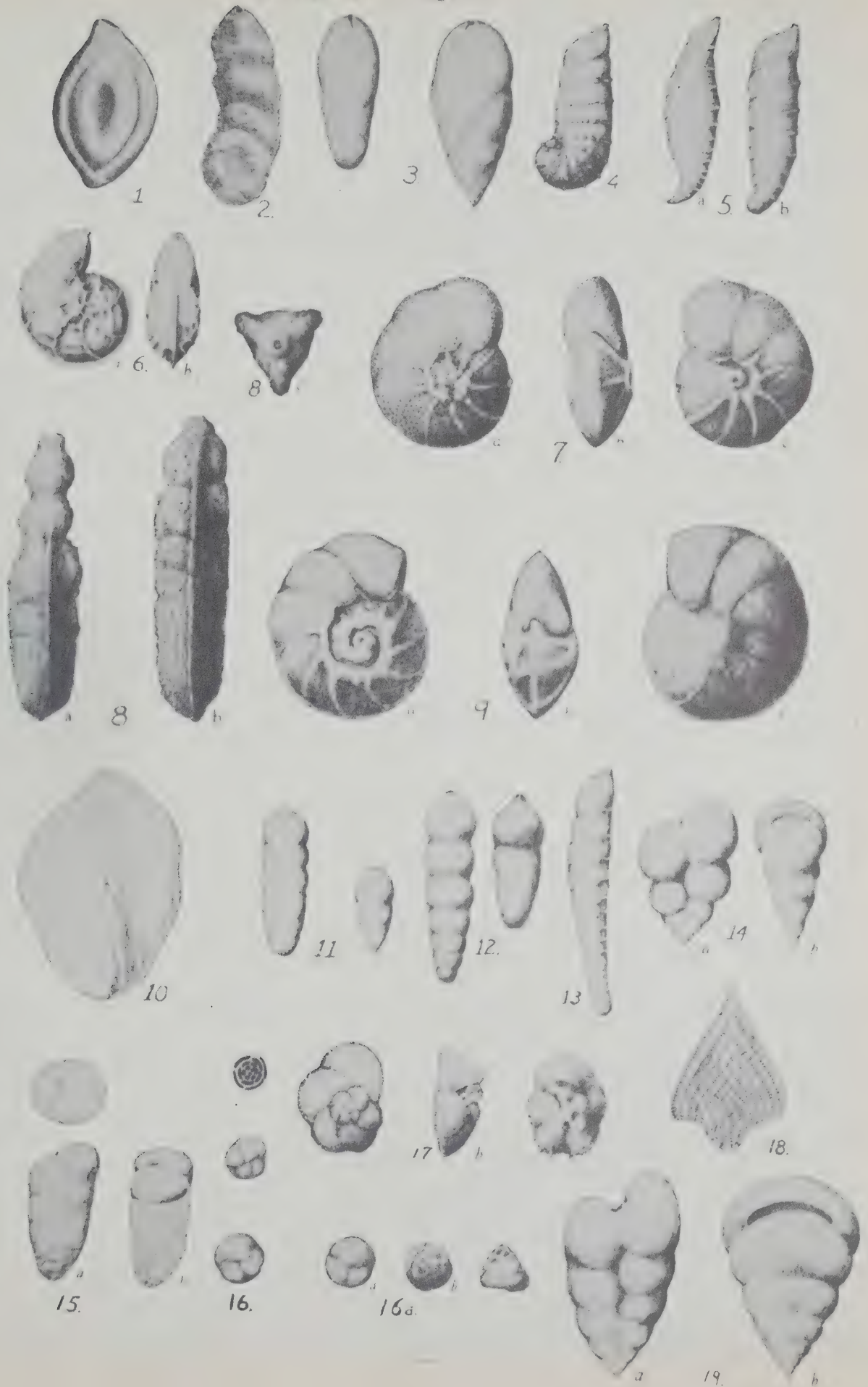


PLATE 2

1. *Vaginulina webbevillensis* (Carsey) x30.....Arkadelphia
Tenn. State Geol. Sur., Bulletin 41, page 76
2. *Bolivina incrassata* (Reuss) x50.....Arkadelphia
Tenn. State Geol. Sur., Bulletin 41, page 92
3. *Bolivina incrassata* (Reuss) x70.....Arkadelphia
Tenn. State Geol. Sur., Bulletin 41, page 92
4. *Globotruncana arca* (Cushman) x50.....Arkadelphia
Journal of Paleontology, Vol. 6, #4, page 344
5. *Guembelina globulosa* (Ehrenburg) x120.....Arkadelphia
Tenn. State Geol. Sur., Bulletin 41, page 88
6. *Guembelina globulosa* (Ehrenburg) x120.....Arkadelphia
Tenn. Geol. State Sur., Bulletin 41, page 88
7. *Cibicides excolata* (Cushman) x50.....Saratoga
Journal of Paleontology, Vol. 5, No. 4, page 312
8. *Bolivinoidea decorata delicatula* (Jones) x40.....Saratoga
Journal of Paleontology, Vol. 5, No. 4, page 306
9. *Bolivinoidea decorata delicatula* (Jones) x55.....Saratoga
Journal of Paleontology, Vol. 6, No. 4, page 344
10. *Arenobulimina presli* (Reuss) x40.....Saratoga
Journal of Paleontology, Vol. 5, No. 4, page 300
11. *Exogyra costata* (Say).....Arkadelphia
U.S. Geol. Sur. Prof. Paper 126, page 36
12. *Pseudo-uvigerina plummerae* (Cushman) x120.....Saratoga
Tenn. State Geol. Sur., Bulletin 41, page 88
13. *Heterostomella faveolata* (Marsson) x40.....Saratoga
Journal of Paleontology, Vol 5, No. 4, page 300
14. *Planulina taylorensis* (Carsey) x40.....Saratoga
Tenn. State. Geol. Sur., Bulletin 41, page 108
15. *Planulina taylorensis* (Carsey) x30.....Saratoga
Journal of Paleontology, Vol. 5, No. 4, page 312



PLATE 3

1. *Cythereis hazardi* (Israelsky) x40.....Nacatoch
Ark. State Geol. Sur., Bulletin 2, page 19
2. *Brachycythere ledaforma* (Israelsky) x35.....Nacatoch
Journal of Paleontology, Vol. 7, No. 2, page 192
3. *Cythereis thomasi* (Israelsky) x35.....Annona
Journal of Paleontology, Vol. 7, No. 2, page 192
4. *Cytheropteron blakei* (Alexander) x35.....Annona
Journal of Paleontology, Vol. 7, No. 2, page 192
5. *Brachycythere sphenoides* (Reuss) x35.....Austin
Journal of Paleontology, Vol. 7, No. 2, page 192
6. *Kyphopyxa christneri* (Carsey) x25.....Annona
Univ. Tex., Bulletin 3101, page 168
7. *Vaginulina regina* (Plummer) x12.5.....Brownstown
Univ. Tex., Bulletin 3101, page 162
8. *Eponides micheliniana* (d'Orbigny) x50.....Annona
Univ. Tex., Bulletin 3101, page 200
9. *Cythereis ornatissima* (Reuss) x35.....Brownstown
Journal of Paleontology, Vol. 7, No. 2, page 192
10. *Cythereis ornatissima* (Reuss) x35.....Brownstown
Journal of Paleontology, Vol. 7, No. 2, page 188
11. *Cytherella muensteri* (Roemer) x50.....Eagle Ford
Journal of Paleontology, Vol. 1, No. 1., page 101
12. *Cytheropteron eximium* (Alexander) x35.....Eagle Ford
Journal of Paleontology, Vol. 7, No. 2, page 188
13. *Anomalina eaglefordensis* (Moreman) x50.....Eagle Ford
Journal of Paleontology, Vol. 1, No. 1, page 101
14. *Gaudryina filiformis* (Berthelin) x50.....Eagle Ford
Journal of Paleontology, Vol. 1, No. 1, page 101
15. *Metiococeras whitei* (Hyatt) x1.....Eagle Ford
Journal of Paleontology, Vol. 1, No. 1, page 101
16. *Metiococeras irwini* (moreman) x $\frac{1}{2}$ Eagle Ford
Journal of Paleontology, Vol. 1, No. 1, page 101



PLATE 4

1. *Exogyra ponderosa* (Roemer) Annona
North Car. Geol. Sur., Vol 5, part 1, page 482
2. *Exogyra ponderosa* (Roemer) Annona
North Car. Geol. Sur., Vol. 5, part 1, page 482
3. *Exogyra ponderosa* (Roemer) Annona
North Car. Geol. Sur., Vol. 5, part 1, page 484
4. *Exogyra ponderosa* (Roemer) Annona
North Car. Geol. Sur., Vol. 5, part 1, page 484
5. *Exogyra cancellata* (Stephenson) Saratoga
North Car. Geol. Sur., Vol. 5, part 1, page 494
6. *Exogyra cancellata* (Stephenson) Saratoga
North Car. Geol. Sur., Vol. 5, part 1, page 494

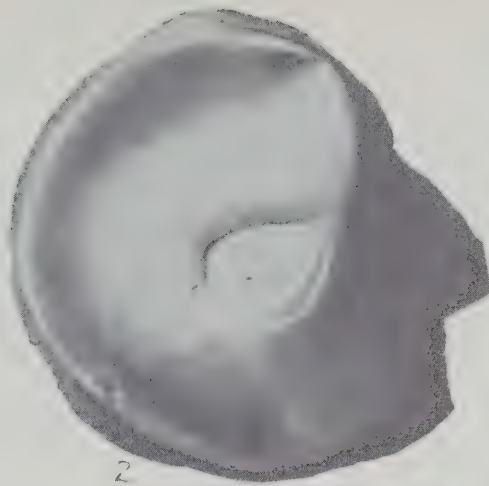
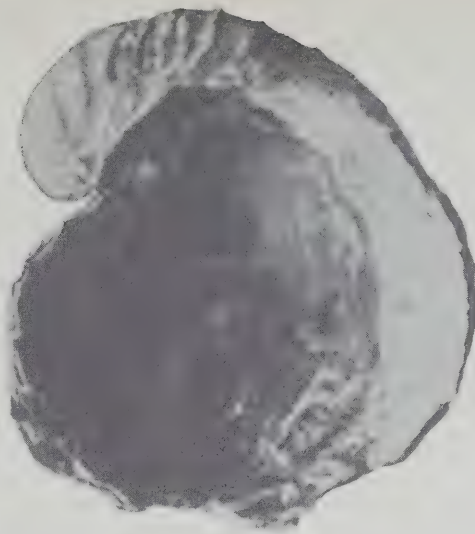


PLATE 5

1. *Exogyra ponderosa* (Roemer).....Annona
U.S.G.S., Prof. Paper 126, page 36
2. *Textularia rioensis* (Carsey) x50.....Washita
Univ. Tex. Bulletin 3101, page 128
3. *Gaudryinella delrioensis* (Plummer) x50.....Washita
Univ. Tex. Bulletin 3101, page 137
4. *Anomalina phalcata* (Reuss) x50.....Washita
Univ. Tex. Bulletin 3101, page 202
5. *Globigerina washitensis* (Carsey) x50.....Washita
Univ. Tex. Bulletin 3101, page 193
6. *Textularia washitensis* (Carsey) x50.....Washita
Univ. Tex. Bulletin 3101, page 127
7. *Haplostiche texana* (Conrad) x7.....Washita
Univ. Tex. Bulletin 3101, page 124
8. *Lenticulina washitensis* (Carsey) x50.....Washita
Univ. Tex. Bulletin 3101, page 142
9. *Cytheridea washitensis* (Alexander) x42.....Washita
Univ. Tex. Bulletin 2907, page 122
10. *Cytheridea washitensis* (Alexander) x42.....Washita
Univ. Tex. Bulletin 2907, page 122
11. *Anomalina phalcata* (Reuss) x50.....Washita
Univ. Tex. Bulletin 3101, page 202
12. *Exogyra arietina* (Roemer) x.9.....Washita
Univ. Tex. Bulletin 1945, page 110
13. *Protocardia texana* (Conrad) xl.3.....Washita
Univ. Tex. Bulletin 1945, page 120



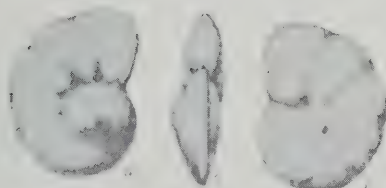
1



2



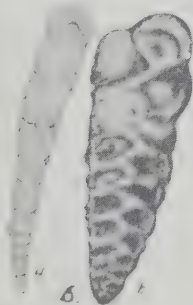
3



4



5



6



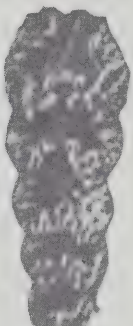
7



8



9



10



11



12



13



14



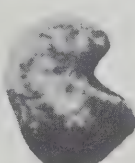
15



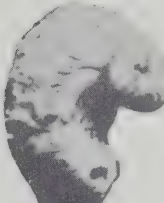
16



17



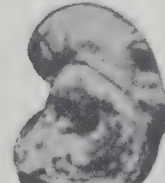
18



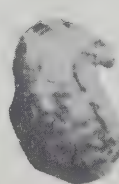
19



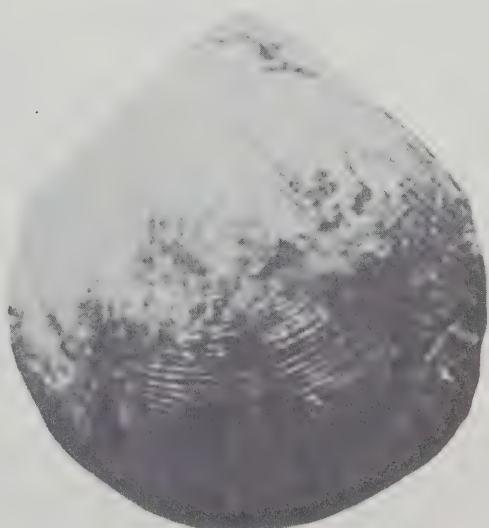
20



21



22



13

PLATE 6

1. *Planularia advena* (Cushman) x15 Austin
U. S. Nat. Museum, Vol. 80 Art. 14, pl. 8
2. *Gyroidina micheliniana* (d'Orbigny) x40 Annona
Journal of Paleontology, Vol. 6, No. 4, Page 344
3. *Kyphopyxa christneri* (Carsey) x40 Annona
Journal of Paleontology, Vol. 6, No. 4, page 336
4. *Eouvigerina americana* (Cushman) x120 Annona
Tenn. State geol. Sur., Bulletin 41, page 88
5. *Globotruncana canaliculata* (Reuss) x50 Annona
Journal of Paleontology, Vol. 6, No. 4, page 344
6. *Pattelina* (?) *antiqua* (Chapman) Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
7. *Ammobaculites subcretacea* (Alexander) x45 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
8. *Ammobaculites subcretacea* (Alexander) x45 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
9. *Verneulina schizea* (Alexander) Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
10. *Spiroplectammina alexanderi* (Lalicker) x107 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 11, part 1
11. *Bigenerina wintoni* (Alexander) x35 Washita
Contributions of Cushman's Lab. For Foram. Research, Vol. 6, part 1
12. *Spiroplectammina whitneyi* (Alexander) x80 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
13. *Spiroplectammina scotti* (Alexander) x35 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
14. *Spiroplectammina goodlandana* (Lalicker) x80 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 11, part 1
15. *Spiroplectammina goodlandana* (Lalicker) x80 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 11, part 1
16. *Vaginulina intumescens* (Reuss) x35 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
17. *Vaginulina kochii* (Roemer) x35 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1
18. *Vaginulina kochii* (Roemer) x30 Fredericksburg
Contributions of Cushman's Lab. for Foram. Research, Vol. 6, part 1



PLATE 7

1. *Ostrea quadriplicata* (Shumard) x.5 Washita
Univ. Tex. Bulletin 1945, page 116
2. *Exogyra arietina* (Roemer) x1 Washita
Univ. Tex. Bulletin 2838, page 112
3. *Gryphea navia* (Hall) Fredericksburg
Univ. Tex. Bulletin 1945, page 114
4. *Cythereis* sp. (cf. *carpenterae*) (Alexander) Fredericksburg
Univ. Tex. Bulletin 2907, page 126
5. *Cythereis* sp. (cf. *fredericksburgensis*) (Alexander) Fredericksburg
Univ. Tex. Bulletin 2907, page 130
6. *Cythereis fredericksburgensis* (Alexander) x42 Fredericksburg
Univ. Tex. Bulletin 2907, page 130
7. *Eocytheropteron tumidum* (Alexander).....Fredericksburg
Journal of Paleontology, Vol. 7, No. 2, page 192
8. *Cytheridea goodlandensis* (Alexander) x42 Fredericksburg
Univ. Tex. Bulletin 2907, page 122
9. *Oxytropidoceras* sp. aff. *belknapii* (Marcou) x.2 Fredericksburg
Univ. Tex. Bulletin 2838, page 226
10. *Cytheridea oliverensis* (Alexander) x42 Fredericksburg
Univ. Tex. Bulletin 2907, page 127
11. *Cytheridea amygdalloides brevis* (Cornuel) x42 Fredericksburg
Univ. Tex. Bulletin 2907, page 127
12. *Cytherella scotti* (Alexander) x42 Fredericksburg
Univ. Tex. Bulletin 2907, page 116

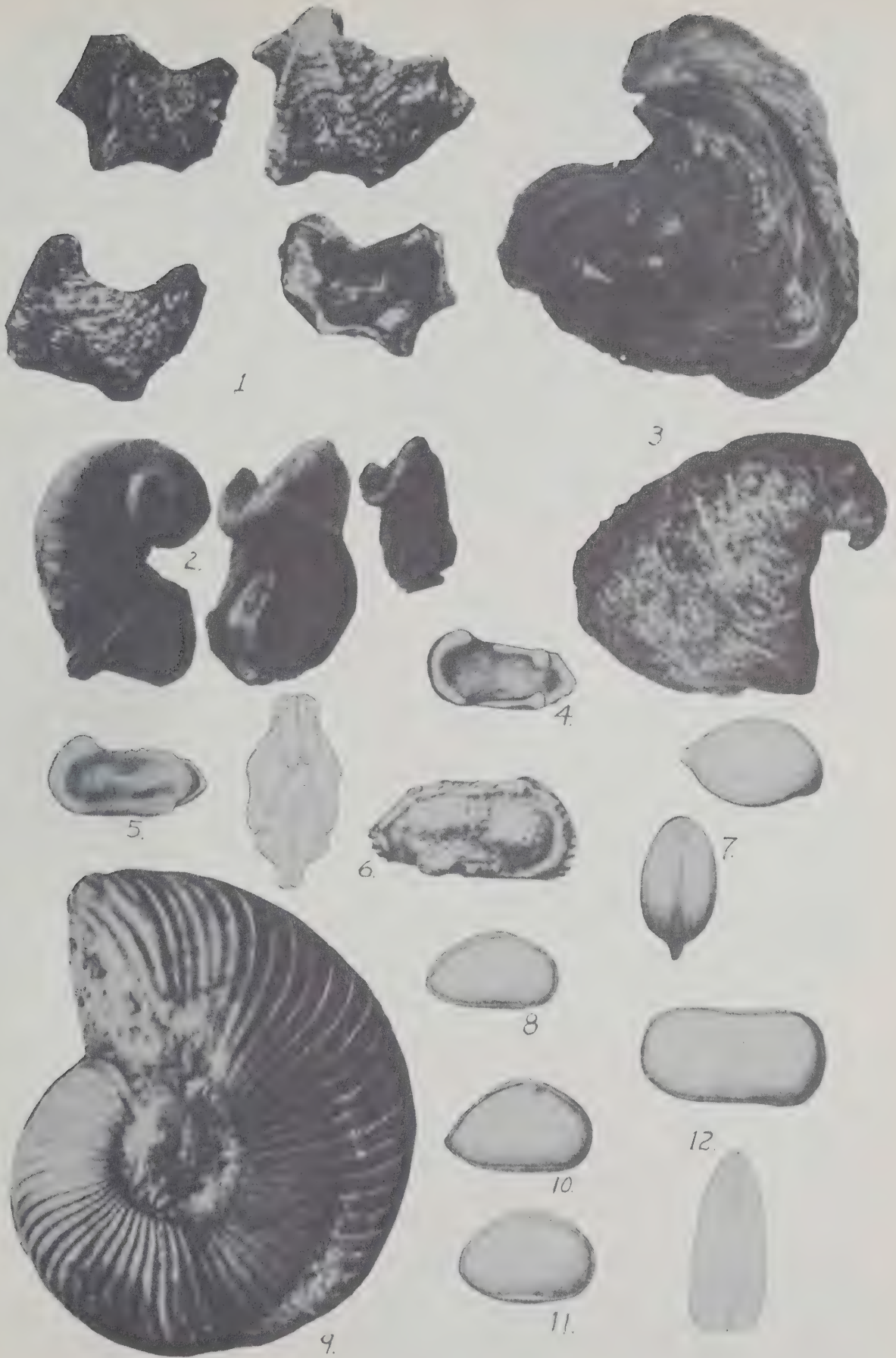


PLATE 8

1. *Exogyra texana* (Roemer) x6 Fredericksburg
Univ. Tex. Bulletin 1945, page 110
2. *Gryphea mucronata* (Gabb) Washita
Univ. Tex. Bulletin 1945, page 114
3. *Oxytropidoceras cf acutocarinata* (Shumard) x1 Fredericksburg
Univ. Tex. Bulletin 2838, page 226
4. *Gryphea washitensis* (Hill) x.77 Washita
Univ. Tex. Bulletin 1945, page 114
5. *Gryphea marcoui* (Hill and Vaughan) x .9 Washita
Univ. Tex. Bulletin 1945, page 114
6. *Gryphea marcoui* (Hill and Vaughan) x .9 Washita
Univ. Tex. Bulletin 1945, page 114
7. *Eocytheropteron trinitensis* (Vanderpool) x75 Trinity
Journal of Paleontology, Vol. 7, No. 4, page 408
8. *Cythereis subgoodlandensis* (Vanderpool) x50 Trinity
Journal of Paleontology, Vol. 7, No. 4, page 408
9. *Cypridea cf ventrosa bispinosus* (Jones) DeQueen
Journal of Paleontology, Vol. 2, No. 2, page 104
10. *Cypridea cf tuberculata gypsumensis* (Sowerby) DeQueen
Journal of Paleontology, Vol. 2, No. 2, page 100

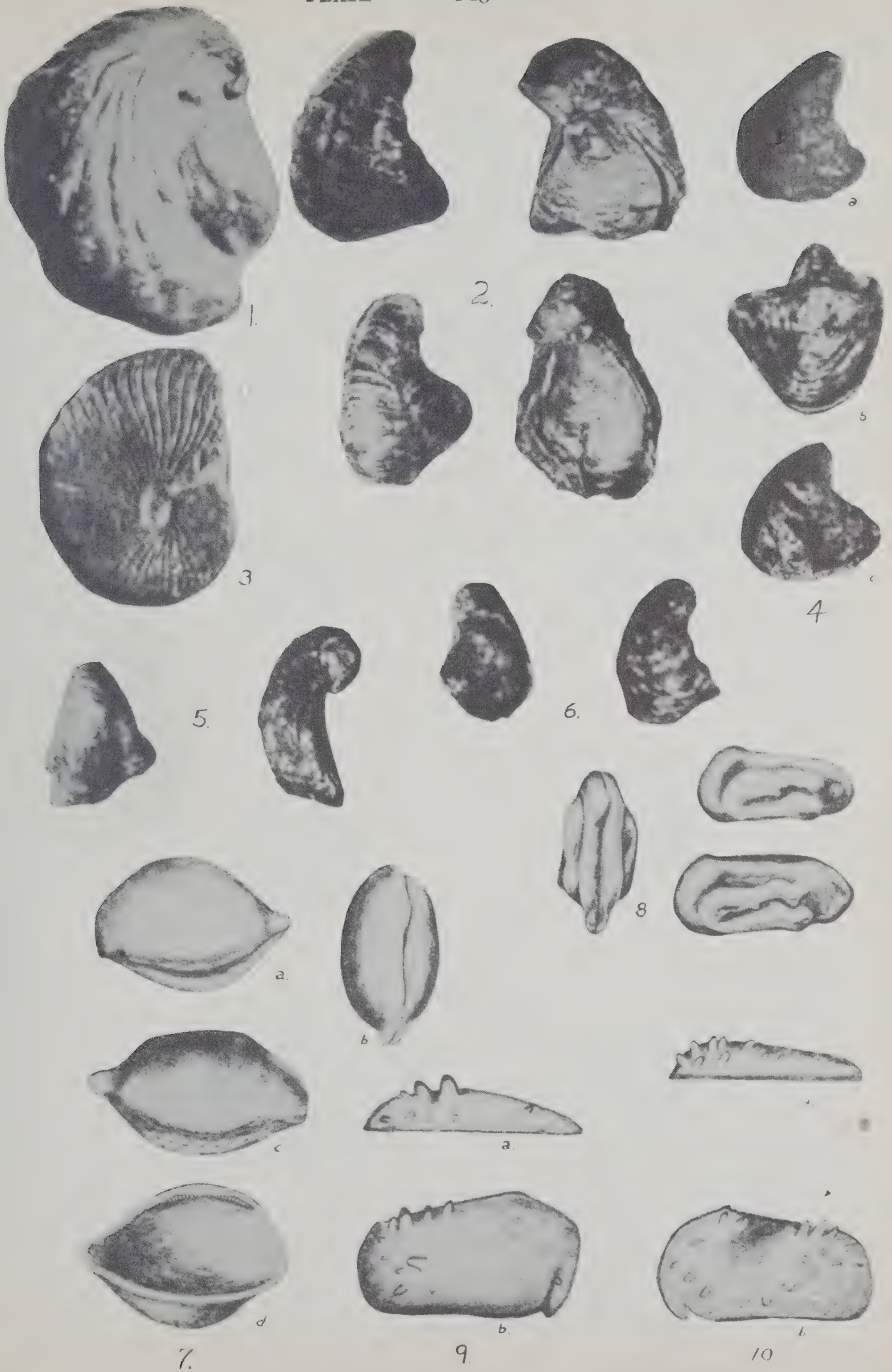
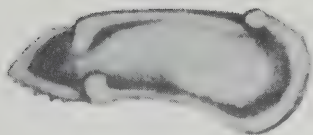
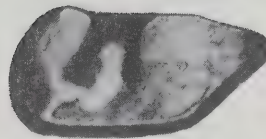


PLATE 9

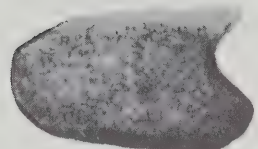
1. Cythereis Sp. x35 JAMES
Core 2701-07', Herzer & Smith Waldrop #1, Sec.4,13S R31W,
Little River Co., Ark.
2. Jonesina (?) Sp. x35 JAMES
Core 2701-07', Herzer & Smith Waldrop #1, Sec.4,13S R31W,
Little River Co., Ark.
3. Eocytheropteron Sp. x35 JAMES
Core 3701-07', Herzer & Smith Waldrop #1, Sec.4,13S R31W,
Little River Co., Ark.
4. Orbitolina texana (Roemer) x4 GLEN ROSE
University Tex., Bulletin 2612, page 22.
5. Jonesina (?) Sp. x35 COTTON VALLEY
Cores 8391-8453', Standard Stewart #1, Cotton Valley Field.
6. Cythere Sp. x35 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.



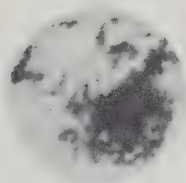
1.



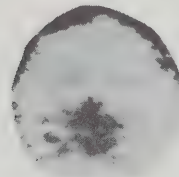
2.



3.



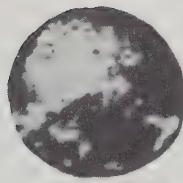
b.



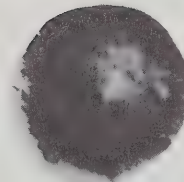
c.



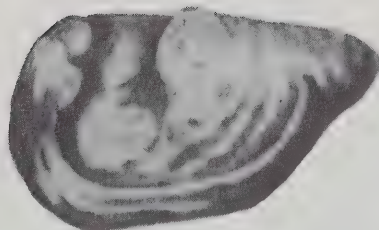
4a



d.



e.



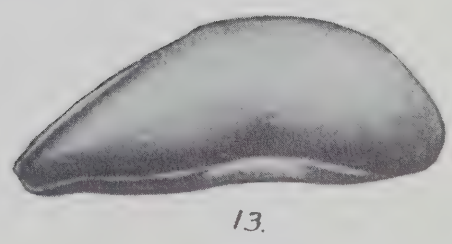
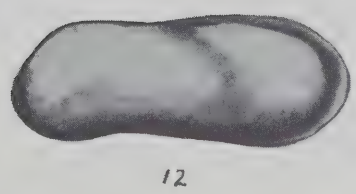
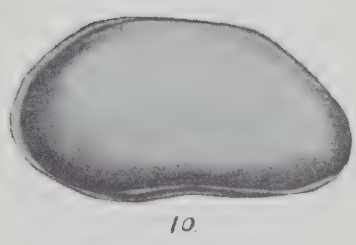
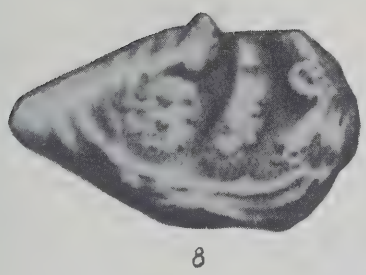
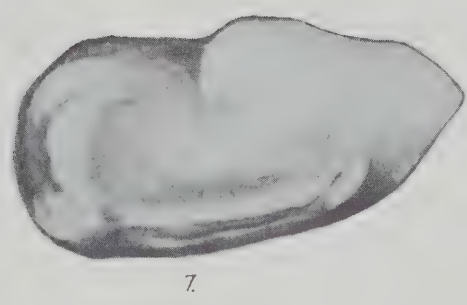
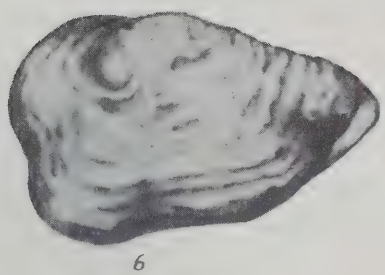
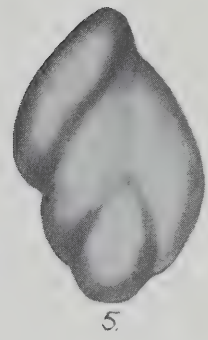
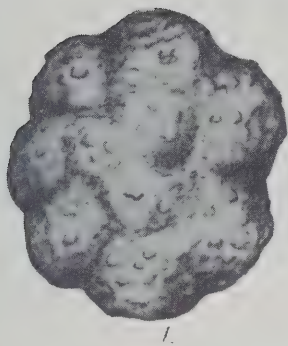
5.



f.

PLATE 10

1. Haplophragmoides Sp. Aax50 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
2. Ammobaculites Sp. x35 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
3. Haplophragmoides Sp.B ax35 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
4. Quinqueloculina Sp. x35 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
5. Guttulina Sp. A ax45 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
6. Cythere (?) Sp. x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
7. Cythere (?) Sp. x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
8. Jonesina (?) Sp. x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
9. Cytherella Sp. x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
10. Cytheridea Sp, x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
11. Cytheridea Sp. x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
12. Loxaconcha Sp. x40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.
13. Paracypris Sp. X40 COTTON VALLEY
Cores 8391-8453, Standard Stewart #1, Cotton Valley Field.



GRIM HOTEL

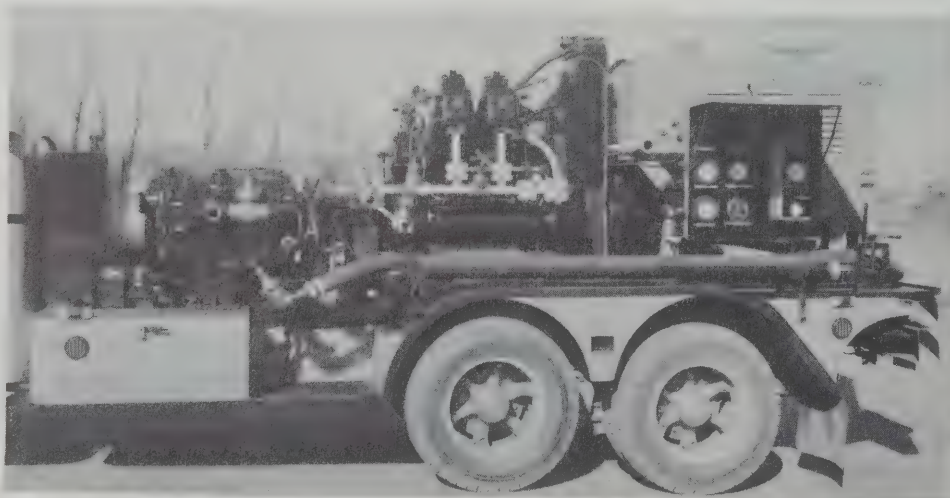
Outstanding Hotel in Texarkana

C. V. MONTAIQUE
Manager

Dowell Incorporated

*First National Bank Bldg.
Shreveport, Louisiana*

*General Office
Tulsa, Oklahoma*



Dowell's specially designed, high pressure, heavy duty pumps and gas compressors supervised by Dowell's experienced treaters have increased oil and gas well production in hundreds of cases. It is these two factors, equipment and personnel, that have so firmly established Dowell in the acknowledged position of leadership.

SCHLUMBERGER

Electrical Well Logging
Side Wall Sampling
Precision Gun Perforating

OFFICES

HOUSTON — LD 408

SHREVEPORT { Day — 2-0737
 { Night — 2-8250

TULSA — 3-0115

EL DORADO — 979

TYLER — 4866

OKLAHOMA CITY — 3-5501

ARDMORE — 76



RODESSA FIELD
CADDO PARISH, LOUISIANA,
CASS AND MARION COUNTIES, TEXAS,
MILLER COUNTY, ARKANSAS.

BY
C. C. CLARK

Location and Extent

The Rodessa oil and gas field is located in the northwestern corner of Louisiana, extending northward into Miller County, Arkansas, and southwestward into Cass and Marion Counties, Texas. The field trends southwestward from Ida, Louisiana, for a distance of 33 miles, varying in width up to a maximum of $4\frac{1}{2}$ miles.

History

The Rodessa field was discovered on August 3, 1930, by the completion of the R. W. Norton-Hill #1 well, located in section 33-23N-16W., Caddo Parish, Louisiana, as a gas well, with total depth of 5506 feet. Several previously drilled wells failed to reach the depths of the reservoir members of the Lower Glen Rose.

Twenty gas wells had been completed in the field by July 7, 1935, when the discovery oil well, the United Gas Public Service Company's Young #1, located $1\frac{1}{2}$ miles north of the discovery gas well, was completed at a total depth of 6048 feet. There were 1,096 wells completed in the field, as of January 1, 1939, from which approximately 81,432,000 barrels of 43° gravity paraffin base oil had been produced.

Structure and Stratigraphy

Plate I shows a structure map of the field, contoured on the base of the Massive Anhydrite. The accumulation of oil and gas occurs on the upthrown side of the Rodessa fault which extends in a northeast-southwest direction from southwest Arkansas through the northwest corner of Louisiana, into Texas. The surface trace of the fault extends from a point just north of Ida, Louisiana, through Cass and western Marion Counties, to a point a short distance north of Jefferson, Texas. Near Rodessa, the fault has a throw of around 500 feet in the Lower Cretaceous and only about 200 feet in the Upper Cretaceous. North of the fault, the beds dip northward with rate of about 100 feet per mile, giving a closure of about 500 feet. Many minor faults, both parallel to and at angles with the major fault, are indicated by surface, subsurface and seismic evidences.

Plate II, Figure 1, shows a north-south Schlumberger cross section through wells located along the Louisiana-Texas state line. On the surface is found the Sparta sand of Claiborne age. The Eocene group is represented by about 450 feet of Claiborne, 350 feet of Wilcox and 600 feet of Midway.

The Upper Cretaceous includes about 150 feet of Arkadelphia, 335 feet of Nacatoch, 500 feet of the Chalk Series (Saratoga, Marlbrook and Annona), 160 feet of Ozan, 60 feet of Buckrange and 370 feet of Brownstown. The Tokio and Woodbine formations are not present in the field proper.

A 310 foot interval of limestones and shales representing the Washita-

Fredericksburg Group of the Comanche Series, lies unconformably upon a 1500 foot section of post Upper Glen Rose Trinity, a section characterized by red beds and sandstones. Underlying the Red Series (Paluxy) there is found a 435 foot section of the Upper Glen Rose made up of shales and limestones, with the first stringer of anhydrite occurring 165 feet below the top of the formation. Two hundred and fifty feet of massive anhydrite underlie the Upper Glen Rose formation.

Plate II, Figure 2, is a section showing the Rodessa member of the Lower Glen Rose formation. The base of the first lower anhydrite stringer is encountered consistently about 100 feet below the base of the Massive Anhydrite.

Producing Zones

The Hill sand horizon, encountered approximately 145 feet below the base of the Massive Anhydrite, is a zone of about 35 feet or less, of rather fine grained sandstones and interbedded sandy shales. The Hill sand is the uppermost producing horizon in the Rodessa field. The Hill sand reservoir is separated from the underlying Caddo Levee Board zone, by about 80 feet of black shales and gray oolitic limestone, with occasional thin streaks of anhydrite.

On the Texas side of the Rodessa field, the Henderson sand immediately overlies the Caddo Levee Board zone; a thickness of 12 to 18 feet is made up of sandy coquina limestone which grades into tan or gray quartz sand.

The Caddo Levee Board zone has an aggregate thickness of about 88 feet and consists of oolitic limestone interbedded with black shales and sand. A sand, varying from 0 to 20 feet in thickness, occurs about 60 feet below the top.

Underlying the Caddo Levee Board zone is a 55-foot thickness of impervious mottled red and green limestone, with interbedded streaks of black shale. Immediately below this mottled zone occurs the Dees horizon, which is the principal reservoir of the field. The Dees horizon varies from a true quartz sand to a sandy limestone interbedded locally with a porous coquina limestone. Underlying the Dees sand is another bed of porous coquina limestone about 20 feet thick, which is found rather uniformly distributed throughout the field. Below this coquina occurs a friable and porous oolitic limestone. The latter two horizons as a unit are often designated as the Young zone. The total average thickness of the Dees horizon is about 95 feet.

Beneath the Rodessa member of the Lower Glen Rose is found the Pine Island member. This member consists of 600 feet of black and gray shales interbedded with hard gray fossiliferous and oolitic limestones in the upper part, and dark gray and brownish gray fossiliferous and oolitic limestones with streaks of black shale, in the basal part.

The Travis Peak formation underlies the Pine Island member of the Lower Glen Rose. It consists of approximately 1800 feet of nonmarine red, gray and greenish gray shales, siltstones and sandstones. The Cotton Valley formation, made up of gray to black marine fossiliferous shales, mudstones and siltstones, with partings and streaks of calcareous sandstones, underlies the Travis Peak. Approximately 3300 feet below the top of the Cotton Valley formation, colorless crystalline salt has been encountered and penetrated for a thickness of 16 feet.

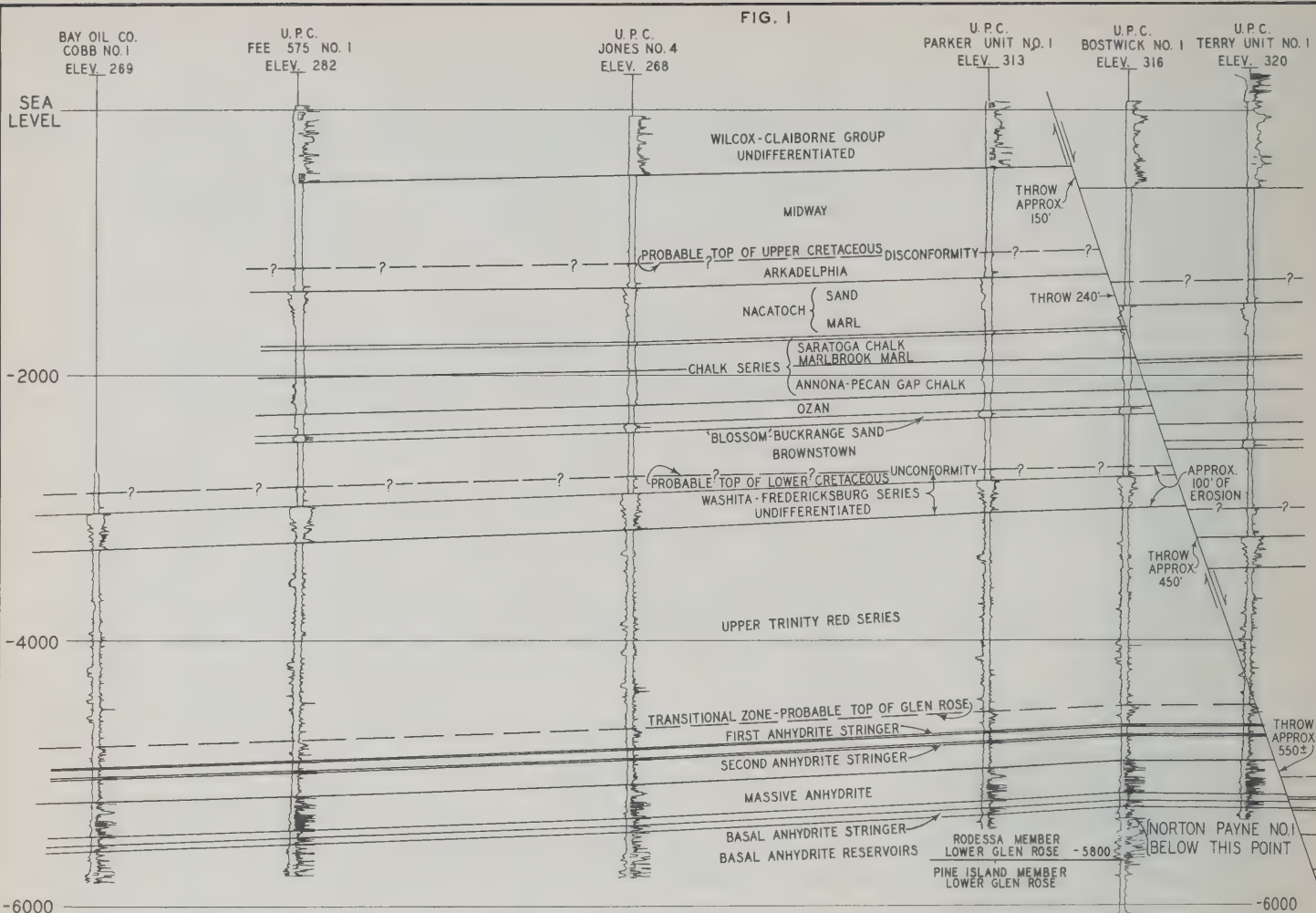


FIG. 2

RODESSA FIELD RESERVOIR HORIZONS

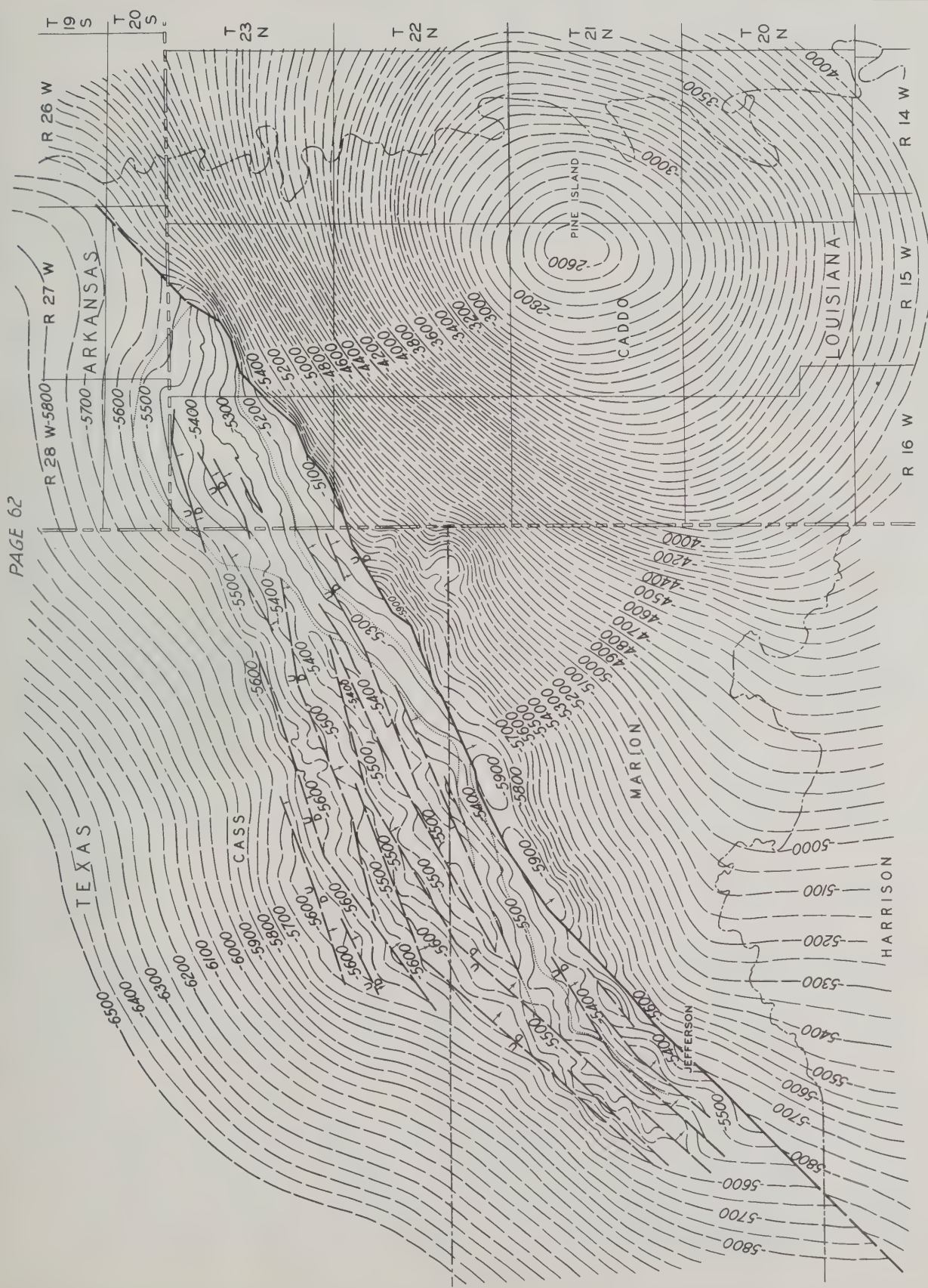
BASE OF MASSIVE ANHYDRITE		THICKNESS IN FEET
	BLACK SHALE AND BROKEN OOLITIC LIME	58
FIRST LOWER ANHYDRITE STRINGER	ANHYDRITE LENSES BLACK SHALE FOSSILIFEROUS LIMESTONE	87
HILL SAND HORIZON	SAND	35
SECOND LOWER ANHYDRITE STRINGER	ANHYDRITE INTERBEDDED BLACK SHALE GREY OOLITIC LIMESTONE	80
CADDO LEVEE BOARD HORIZON	60 FT. ± ↑ OOLITIC LIMESTONE SHALE SAND SHALE OOLITIC LIMESTONE	88
MOTTLED RED AND GREEN LIMESTONE	IMPERVIOUS MOTTLED RED AND GREEN LIMESTONE WITH OCCASIONAL BEDS SHALE AND DENSE LIMESTONE	55
DEES HORIZON	OCCASIONAL COQUINA DEES SAND COQUINA LIMESTONE OOLITIC SAND OR "MEALY" LIMESTONE	95
TOP OF BASAL BLACK SHALE MEMBER OF GLEN ROSE FORMATION		

TOP COTTON VALLEY (LOWER MARINE) 8180' -8000

TOP SALT 11470'

TOTAL DEPTH 11486'

CROSS SECTION ALONG LOUISIANA-TEXAS STATE LINE RODESSA FIELD



RODESSA FIELD - STRUCTURE MAP

CONTOUR INTERVAL 50 FEET

DATUM-BASE MASSIVE ANHYDRITE

Development Statistics and Present Activity,
as of January 1, 1939.

<u>Oil Production in Barrels</u>		<u>Daily Average Oil Production Per Well, in Barrels</u>	
Louisiana	51,498,000	Louisiana	63
Texas	26,568,000	Texas	60
Arkansas	<u>3,366,000</u>	Arkansas	<u>50</u>
Total	81,432,000		

<u>Number of Wells</u>		<u>Number of Drilling Wells</u>	
Louisiana	484	Louisiana	1
Texas	504	Texas	8
Arkansas	<u>108</u>	Arkansas	<u>4</u>
Total	1,096	Total	13

Acknowledgement

Map, sections and a large part of the information were taken from J. S. Ivy's paper, "The Rodessa Field," presented at the A. P. I. meeting at Shreveport in 1936.

COMMON & SIGNIFICANT SPECIES
OF FORAMINIFERA & OSTRACODA
OF THE
BROWNSTOWN, OZAN & ANNONA FORMATIONS
OF SOUTHWESTERN ARKANSAS
BY
C. I. ALEXANDER

The accompanying chart presents graphically the stratigraphic ranges of species of foraminifera and ostracoda found in the Brownstown, Ozan and Annona formations of southwestern Arkansas. No attempt has been made to present a complete faunal list, but all of the common and significant species are included.

The chart is the result of the study of samples collected from exposures along a traverse extending southeastward from the vicinity of Ben Lomond, Sevier County, to White Cliffs, Little River County. Locations and elevations of samples were determined by a plane table survey. Samples were collected at an average interval of five feet; at formational contacts samples were collected at one or two foot intervals.

The Annona-Ozan contact in this area is rather indefinite. The hard bluish argillaceous marls, which form the lower portion of the section exposed at Chalk Bluff on Little River at White Cliffs, are sufficiently chalky to carry a number of species of foraminifera generally regarded as characteristic of the Annona. The base of the section exposed here is apparently within twenty to twenty-five feet of the top of the Buckrange sand (forty to forty-five feet to the top of the Brownstown or base of the Ozan). This is a much shorter Ozan section than is recognized on the surface elsewhere in Southern Arkansas or in the subsurface in Southern Arkansas and northern Louisiana. One interpretation of this section is that the locally highly calcareous character of the upper Ozan strata, represented by the above described argillaceous marls, accounts for the presence of the Annona fauna below the level at which it normally occurs. It is well known that within the limits of its stratigraphic range, the presence or absence of the "Annona fauna" is controlled largely by the ecologic conditions. Most of the species of the fauna, for example, are present in the Saratoga chalk, but are absent in the Marlbrook shales and marls which intervene between the Annona and Saratoga chalks.

The writer is inclined to place the Annona-Ozan contact at the base of the hard, white, massive chalk of the Chalk Bluff Section.

It is interesting to observe that while Ellis and Teagle, in their paper on the "Pecan Gap Chalk in Texas" report the absence of their basal "Flabellamina Compressa zone" in the Chalk Bluff or White Cliffs section, the writer found F. Compressa in every sample collected both at the bluff and in exposures of the chalk along the road near White Cliffs.

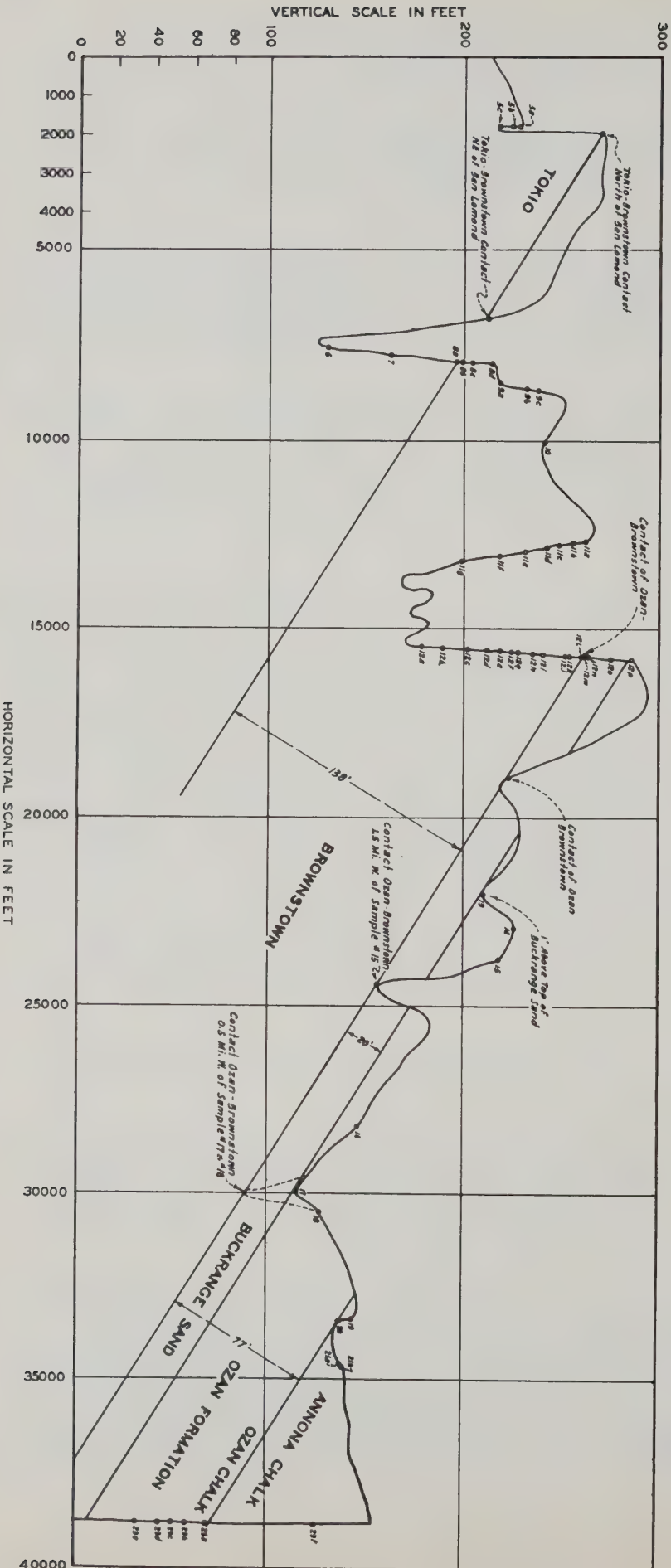
The columnar stratigraphic section represents a section from the top of the Tokio through the Brownstown, Ozan, and Annona to the top of Chalk Bluff at White Cliffs, Arkansas. The locality numbers indicate the section exposed at each outcrop examined. Outcrops represented by an arrow were small, and only one sample was collected at each, at the stratigraphic position indicated. Outcrops represented by a bracket exposed a more extensive section, and several samples were collected. Outcrop numbers correspond to those on the distribution chart.

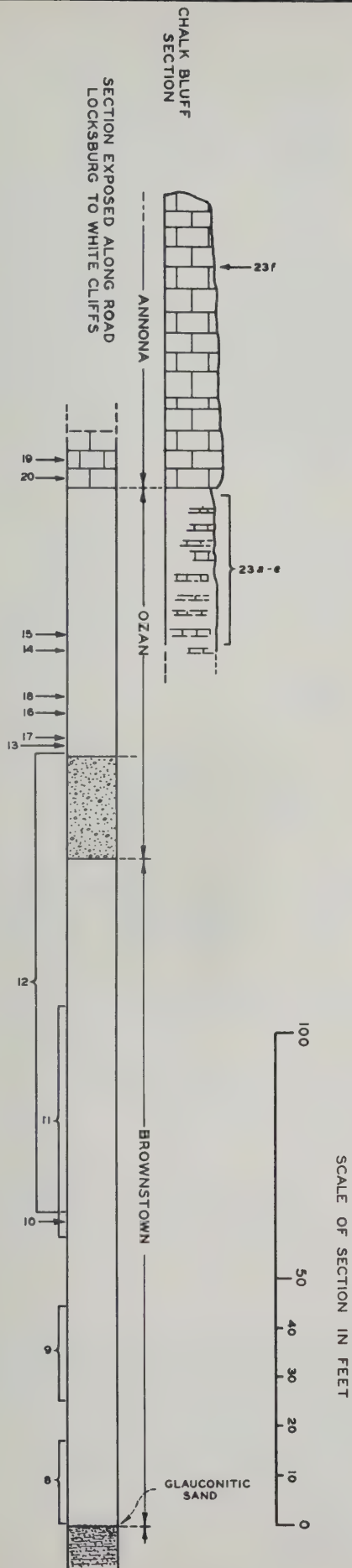
SEVIER COUNTY ARKANSAS

BY
C. I. ALEXANDER & PAUL NASH

SEE BEN LOMOND BROWNSTOWN SHEET
FOR LOCATION OF CROSS SECTION

REGIONAL STRIKE - N 76° E
REGIONAL DIP - 5 14° E
AT 65 FT. PER MILE



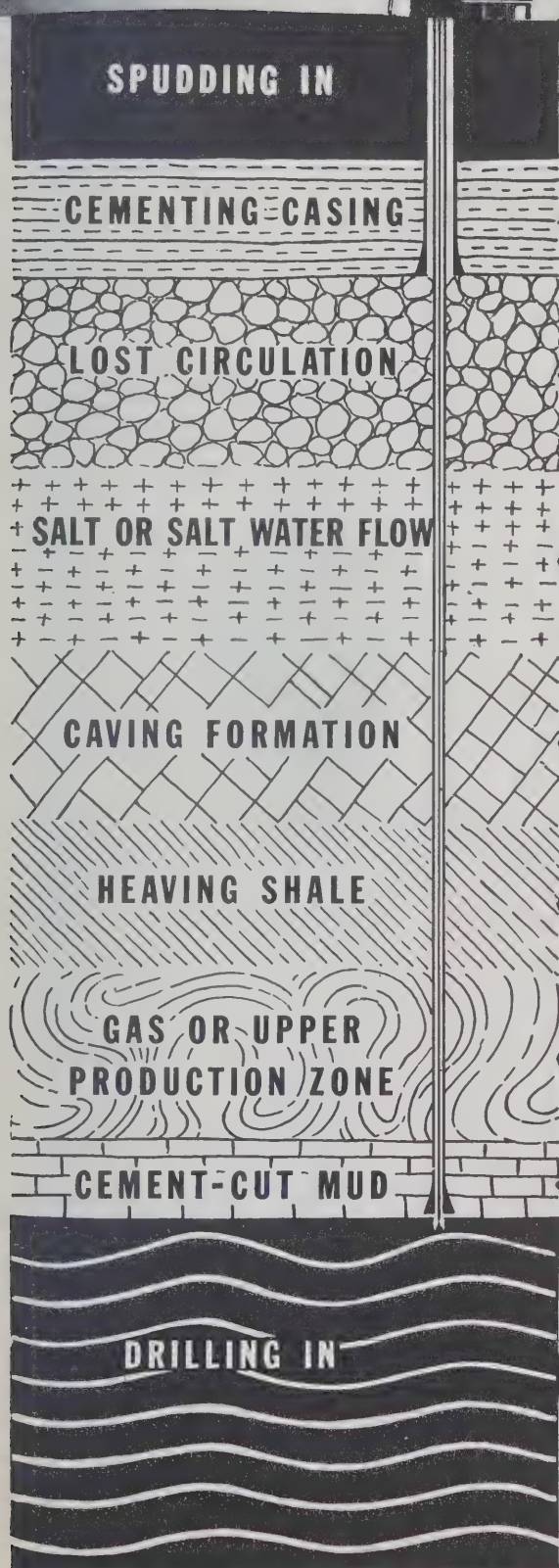


										X	X	X	X	X	X	ANOMALINA GROSSORUGOSA
										X	X	X	X	X	X	ANOMALINA HENBESTI
X	X	X	X													ANOMALINA KANSASSENSIS
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	ANOMALINA TAYLORENSIS
													X			ARENOBULIMINA PRESLEYI
											X	X	X			BOLIVINITA ELEYII
											X			X	X	BOLIVINOIDES DECORATA
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	BULIMINELLA CARSEYAE
														X		CIBICIDES EXCOLATA
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	CIBICIDES NELSONI
			X	X	X	X	X	X	X	X	X	X	X	X	X	CLAVULINA AMORPHA
													X	X	X	CLAVULINA DISJUNCTA
			X	X	X											CLAVULINA AFF. PARISENSIS
													X	X	X	CLAVULINA TRILATERA
													X	X	X	DOROTHIA PUPOIDES
								X					X	X	X	EGGERELLA TROCHOIDES
	X			X									X			EQUVIGERINA AMERICANA
		X	X													EQUVIGERINA AUSTINIANA
										X	X				X	FLABELLINA INTERPUNCTATA
												X			X	FLABELLINA PROJECTA
					X								X	X		FLABELLINA RUGOSA
							X					X			X	FLABELLAMMINA COMPRESSA
	X	X	X	X				X								GAUDRYNA CARINATA
													X	X	X	GAUDRYNA CHAPMANI
	X	X	X	X	X	X	X	X	X	X	X					GAUDRYNELLA CAPITOSA
X	X	X	X	X	X				X	X	X	X	X	X	X	GYROIDINA DEPRESSA
				X			X			X	X	X	X			GYROIDINA MICHELINIANA
X	X	X														GYROIDINA SUBCONICA
							X			X	X	X	X			HETEROSTOMELLA FOVEOLATA
				X			X			X	X	X	X			HETEROSTOMELLA STEPHENSONI
X	X	X	X	X	X	X	X	X	X		X					KYPHOPYXA CHRISTNERI
											X		X			LITUOLA TAYLORENSIS
	X	X	X	X	X											LOXOSTOMA CLAVATA
X	X	X	X	X			X				X	X	X			LOXOSTOMA TEGULATA
X	X	X	X	X												NEOBULIMINA CANADENSIS
				X	X		X	X	X	X						NEOBULIMINA SPINOSA
				X							X					PSEUDOUVIGERINA PLUMMERAE
X	X	X	X													VAGINULINA REGINA
		X	X													VAGINULINA SIMONDSI
		X	X													VAGINULINA TEXANA
				X	X	X	X		X	X	X	X	X			BAIRDIA ROTUNDA
X	X	X	X	X	X				X	X						BRACHYCYTHERE SPHENOIDES
		X	X	X												BRACHYCYTHERE TAYLORENSIS
X	X	X	X	X												CYTHEREIS BICORNIS
X	X	X	X	X												CYTHEREIS HANNAI
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	CYTHEREIS OZANA
				X		X	X	X	X	X	X					CYTHEREIS PLUMMERI
				X							X	X	X			CYTHEREIS SEMIPPLICATA
		X	X													CYTHEREIS SPOORI
X	X	X	X	X			X				X			X		CYTHEREIS THOMASI
X	X	X	X	X	X	X	X	X	X	X	X	X	X			CYTHERELLA COMPLANATA
		X	X	X	X			X	X							CYTHERELLA PARALLELA
				X	X	X	X	X	X	X	X					CYTHERIDEA INSOLITA
	X	X	X													CYTHERIDEA PLUMMERI
	X	X	X													CYTHEROPTERON FURCALATUM
X	X		X	X	X	X					X	X		X		KRITHO CUSHMANI
				X							X					MONOCERATINA PEDATA
		X	X				X	X	X							ORTHONOTACYTHERE HANNAI (VAR.)
	X	X	X													ORTHONOTACYTHERE SCROBICULATA
																EUCYTHERURA CHELODON
5	9					X	X	X	X	X	X	X				
												</				

"LITERATURE"

- Alexander, C. I. "Ostracoda of the Cretaceous of North Texas," Univ. of Texas Bul. No. 2907, 1929.
- Alexander, C. I. "Shell Structure of the Ostracoda Genus Cytheropteron and Fossil Species from the Cretaceous of Texas," Jour Paleont., Vol 7, No. 2, (June 1933), pp 181-214.
- Alexander, C. I. "Ostracoda of the Genera Monoceratina and Orthonotacythere from the Cretaceous of Texas," Jour Paleont., Vol. 8, No. 1, (March 1934) pp 57-67.
- Alexander, C. I. & Smith, J. P. "Foraminifera of the Genera Flabellamina and Frankeina from the Cretaceous of Texas," Jour. Paleont., Vol. 6, No. 4 (Dec. 1932) pp 299-311.
- Cushman, Joseph A. "The Foraminifera of the Saratoga Chalk," Jour Paleont., Vol 5, No. 4 (Dec. 1931) pp 297-328.
- Cushman, Joseph A. "The Foraminifera of the Annona Chalk," Jour Paleont., Vol. 6, No. 4 (Dec. 1932) pp 330-345.
- Ellisor, Alva C. & Teagle, John "Pecan Gap Chalk in Texas," Bull. Amer. Assoc. Petrol. Geol., Vol. 18, No. 11 (Nov. 1934) pp 1506-1536.
- Israelsky, M. G. "Upper Cretaceous Ostracoda of Arkansas," Ark. Geol. Survey Bull.
- Morrow, A. L. "Foraminifera and Ostracoda from the Upper Cretaceous of Kansas," Jour Paleont., Vol 8, No. 2, (June 1934) pp 186-205.
- Plummer, Hellen J. "Some Cretaceous Foraminifera in Texas," Univ. of Texas Bull. No. 3101, pp 109-203, 1931.

There's a BAROID PRODUCT for every step in drilling



AQUAGEL
BAROCO

Aquagel—Concentrated colloidal gel-forming clay. One ton makes about 150 barrels of excellent drilling fluid when mixed with fresh water.

Baroco—For use where water is contaminated with salt.

AQUAGEL-CEMENT

Aquagel-Cement—Gives a better bond between casing and hole, improving shut-off of gas, water, or oil.

AQUAGEL FIBROTEX
AQUAGEL-CEMENT

Aquagel—In proper concentration often prevents or restores loss of circulation.

Fibrotex—12 to 14 lbs. of **Fibrotex** per barrel of mud provide unusual sealing qualities.

Aquagel-Cement—Possesses unusual ability to plug creviced or cavernous areas. Does not flow out like neat cement.

BAROCO
ZEOGEL
BAROID

Baroco—Maintains viscosity and wall-building properties in the presence of salt.

Zeogel—Possesses superior suspending qualities in salt water.

Baroid—Muds suitably weighted with **Baroid** counterbalance the pressures from salt water flows.

AQUAGEL
BAROID

Aquagel—By preventing the penetration of water, the use of **Aquagel** frequently eliminates the tendency of formations to cave.

Baroid—Muds weighted with **Baroid** have demonstrated their efficiency in holding caving formations in place.

BAROID
STABILITE

Baroid—Muds can be made up to high weights for the control of heaving or disintegrating shale.

Stabilite—The improved chemical thinner—maintains workable viscosities even though highly weighted muds are used in shale areas.

STABILITE
BAROID
AQUAGEL

Stabilite—Frees entrained gas and reduces viscosity.

Baroid—Pumpable muds weighing as much as 145 lbs. per cubic foot can be made with **Baroid**.

Aquagel—Helps prevent the filtration of water into formations.

DISPERSO

Disperso—Often prevents discarding cement-cut mud by reducing viscosity and restoring wall-building properties.

AQUAGEL
BAROID
STABILITE

Aquagel—Wells drilled in with straight **Aquagel** water mud in low pressure areas, swab on production and clean up quicker because the thin, impervious mud cake is very easy to remove.

Baroid—A combination of **Baroid** and **Aquagel** provides the ideal drilling fluid for pressure areas.

Stabilite—Provides safety by keeping mud free of gas, thereby maintaining weight required. • • • **Stocks of Baroid Products, and Service Engineers, are available in or near all active oil fields.**



Stocks carried and service engineers available in all active oil fields. Look for this trade mark under "Oil Well Drilling Mud" in your classified telephone directory for our nearest service engineer and distributor.

J. I. ROBERTS DRILLING CO.

426 Giddens-Lane Building

SHREVEPORT, LA.

SECURITY ABSTRACT COMPANY

C. H. FOSTER, Manager

Complete Abstracts of Columbia and Union Counties Arkansas

Fee, Lease, and Mineral Own-
erships made on short notice.

EL DORADO,
UNION COUNTY,
ARKANSAS
PHONE 351

MAPS

MAGNOLIA,
COLUMBIA COUNTY,
ARKANSAS
PHONE 58

Serving the Oil Industry of El Dorado and South Arkansas Since 1920

*The Year OIL Was Discovered
in UNION COUNTY*

The First National Bank of El Dorado

- CAPITAL FUNDS OVER . \$1,000,000.00
- DEPOSITS OVER \$5,000,000.00

DIRECTORS

R. N. Garrett	W. F. McWilliams
Hendrick Alphin	J. K. Mahony
R. N. Benson	C. H. Murphy
R. N. Garrett, Jr.	O. G. Murphy
H. C. McKinney	J. A. Rowland
H. C. McKinney, Jr.	J. D. Trimble
M. G. Wade	

The First National Bank
OF
EL DORADO, ARK.

Member of Federal Deposit Insurance Corporation



DEVELOPMENT IN SOUTHERN ARKANSAS AND NORTHERN LOUISIANA IN 1938

BY

W. C. SPOONER

The development in southern Arkansas and northern Louisiana during 1938 was primarily in search of oil and gas from the Glen Rose formation, the Cotton Valley formation, and the Smackover limestone.

The wells drilled outside of the producing fields and the discovery wells are listed in Table I.

The new discoveries during the year are listed below.

Arkansas

Magnolia field T. 17S. R. 20W. Columbia County
Discovery well: Kerr-Lynn Oil Co.'s Barnett No. 1
Section 14 T. 17S. R. 20W.
Producing horizon: Smackover limestone. Depth 7730 feet.

Village field T. 17S. R. 19W. Columbia County
Discovery well: Standard Oil Co.'s Phillips No. 1
Section 15 T. 17S. R. 19W.
Producing horizon: Smackover limestone. Depth 7603 feet.

Atlanta field T. 18S. R. 19W. Columbia County
Discovery well: Tidewater-Seaboard's Beene No. 1
Section 15 T. 18S. R. 19W.
Producing zone: Smackover limestone. Depth 8332 feet.

Falcon field T. 15S. R. 22W. Nevada County
Discovery well: Texas Canadian Oil Co.'s Stocks No. 1
Section 9 T. 15S. R. 22W.
Producing zone: Nacatoch sand. Depth 1300 feet.

Louisiana

Shreveport field T. 18N. R. 14W. Caddo Parish
Discovery well: R. E. Allison's Ellerbe No. 1
Section 27 T. 18N. R. 14W.
Producing zone: Pettit zone (Lower Glen Rose) Depth 5582 feet.

New producing horizons have been found in the developed fields of the Caddo District and in the Cotton Valley and Shongaloo fields.

In the Caddo field, Vivian district, the Colonial Oil Company's Thigpen and Herold No. 1, Section 34 Township 22 North Range 16 West, was completed as an oil producer in the Tokio. This discovery led to considerable drilling in the area with oil production additionally discovered in the Paluxy sand. The production is principally from thin lenticular sands; the discovery is not a major discovery.

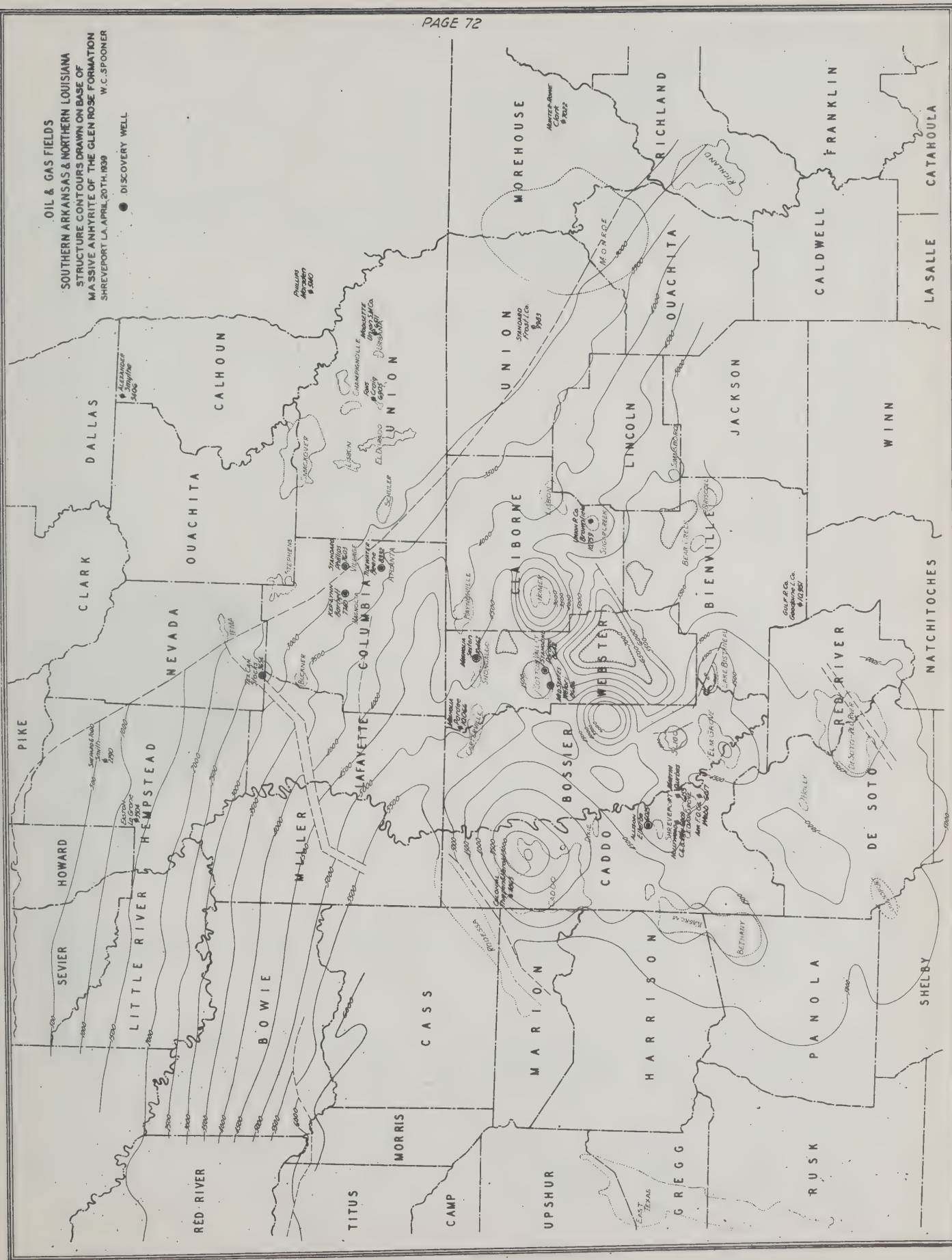
In the Cotton Valley field, producing principally gas and distillate from several sands in the Cotton Valley formation, flank production of oil was found in the "D" sand and in the Bodcaw sand. The discovery wells were:

Midstates Oil Co.'s Welori Lumber Co. No. 1 Sec. 3 T. 20N. R. 10W. "D" sand

OIL & GAS FIELDS

SOUTHERN ARKANSAS & NORTHERN LOUISIANA
STRUCTURE CONTOURS DRAWN ON BASE OF
MASSIVE ANHYDRITE OF THE GLEN ROSE FORMATION
SHREVEPORT LA. APRIL 20TH 1939 W.C. SPOONER

● DISCOVERY WELL



Stanolind Oil & Gas Co.'s Pardee No. 1 Sec. 36 T. 21N. R. 10W. Bodcaw sand.

The oil production from these sands apparently is limited to a narrow band along the margin of the gas-distillate producing area.

In the Shongaloo field the Magnolia Petroleum Company's Sexton No. 1 well, Section 32 Township 23 North Range 9 West, was completed as a gas and distillate well at a depth of 8990 feet. The producing zone in the Sexton well is a sand in the lower part of the Cotton Valley formation. The Sexton No. 1 well was drilled to a total depth of 10,462 feet and plugged back to the producing depth. Considering the depth, the thickness and porosity of the producing sand, this discovery is not of major importance.

In the Sugar Creek field, Township 19 North Range 5 West, Claiborne Parish, the Union Producing Company's Brownfield No. 2 well in Section 5 Township 19 North Range 5 West was drilled to a total depth of 10,759 feet where it was junked. This well had gas and distillate bearing sand in the Cotton Valley formation which, however, was less porous than the equivalent sands in the Cotton Valley field.

IMPORTANT DRY HOLES DRILLED DURING 1938

The present knowledge of the stratigraphy indicates that future production of oil and gas from this region will be obtained principally from the Cotton Valley formation and from the Smackover limestone.

The Cotton Valley formation consists of shale and interbedded sands. The Smackover limestone is made up of an upper porous and oolitic member - the oil and gas producing member - and a lower dense non-porous member. Both of these formations have shown marked lateral variation in lithology and these variations are determining in large part their suitability as reservoirs for oil and gas accumulation. For these reasons several of the deep dry holes drilled during the year were important in that they helped in defining the area in which favorable reservoir conditions can be expected to be present in the deeper formations.

The Modisette et al Frost Lumber Company No. 1 in Section 14 Township 21 North Range 1 East, Union Parish, Louisiana, and the Hunter Rowe et al Clark No. 1 in Section 10 Township 20 North 7 East, Morehouse Parish, Louisiana, penetrated the Smackover limestone. The Cotton Valley formation and the Smackover limestone were generally lacking in porosity.

The Gulf Refining Company's Goodpine Lumber Company No. 1 well in Section 25 Township 14 North Range 8 West, Bienville Parish, Louisiana, penetrated most of the Cotton Valley formation and encountered only thin hard dense sandstones in this formation.

In the Shreveport area the Arkansas Louisiana Gas Company's Webb No. 1 in Section 4 Township 16 North Range 14 West, the Hollywood Oil Company's C and B Realty Company No. 1 in Section 22 Township 17 North Range 14 West, and F. W. Martin Querbes No. 1 in Section 37 Township 17 North Range 13 West, failed to find porosity in the lower part of the Glen Rose formation and thus limited the production from the Shreveport field to the south.

In Madison Parish, Louisiana, the Continental Oil Company drilled two wells on an interior salt dome, both dry holes.

TABLE I

COMPANY AND FARM	LOCATION	TOTAL DEPTH	BOTTOM OF HOLE IN
<u>LOUISIANA</u>			
BIENVILLE PARISH			
De Soto Oil & Gas Co. - Fleming No. 1	18-16N-9W	5525	Travis Peak
Gulf Refg. Co. - Goodpine Lbr. Co. No. 1	25-14N-8W	10,951	Cotton Valley
Producers O & G Co. - W. C. Locke No. 1	9-15N-10W	5407	Lower Glen Rose
BOSSIER PARISH			
W. M. Chambers - J. N. Thomas No. 1	10-22N-11W	3197	Tokio
CADDO PARISH			
R. E. Allison-Ellerbe No. 1	27-18N-14W	6025	Travis Peak
Arkansas La. Gas Co.-F. F. Webb No. 1	4-16N-13W	6017	Travis Peak
Colonial Corp.-Thigpen & Herold No. 1	34-22N-16W	4865	Lower Glen Rose
Hollywood O. Corp.-C&B Realty Co. No. 1	22-17N-14W	6009	Travis Peak
F. W. Martin et al - Querbes No. 1	37-17N-13W	6155	Travis Peak
Oils, Inc. - A. Cazeaux No. 1	16-16N-13W	3462	Paluxy
CALDWELL PARISH			
G. W. Zeigen - La. Cent. Lbr. Co. No. 1	20-14N-3E	1767	Wilcox
G. W. Zeigen - La. Cent. Lbr. Co. No. 14	20-14N-3E	1766	Wilcox
CLAIBORNE PARISH			
W. L. McClanahan - J. T. Lewis No. 1	25-20N-7W	5507	Glen Rose
Union Prod. Co. - Brownfield No. 2	5-19N-5W	10,759	Cotton Valley or older
DE SOTO PARISH			
Clear Lake O. Co. - Wolluns No. 1	29-12N-12W	2690	Paluxy
La. Seaboard O. Refg. Co. - Lawrence No. 1	36-12N-14W	2894	Paluxy
P. L. Miller - Jal. Drlg. Co. No. 2	5-11N-11W	4040	Lower Glen Rose
The Hunter Co. - Parker No. 1	36-12N-16W	5187	Lower Glen Rose
Alexander et al - Stell No. 1	5-12N-16W	6002	Lower Glen Rose
FRANKLIN PARISH			
Southern Star Pet. Co. - Grayson No. 2	36-12N-6E	1754	Sparta
No. 3	36-12N-6E	2802	Wilcox
LA SALLE PARISH			
Placid O. Co. - La. Cent. L. Co. No. 5	12-9N-2E	1850	Wilcox
No. 6	20-10N-4E	1851	Wilcox
Trechelle et al - Gallagher and Tannehill No. 1	31-9N-2E	1751	Wilcox

COMPANY AND FARM	LOCATION	TOTAL DEPTH	BOTTOM OF HOLE IN
LINCOLN PARISH			
Ludell J. Corp. - M. L. Gill No. 1	36-20N-2W	6000	Travis Peak
Oakes & Easton - N. L. Griggs No. 1	36-18N-1W	6259	Travis Peak
MADISON PARISH			
Continental O. Co. - Singer Mfg.			
Co. No. 1	3-15N-11E	4334	Salt
No. 2	2-15N-11E	4486	Midway
MOREHOUSE PARISH			
Hunter-Rowe et al - E. M. Clark No. 1	10-20N-7E	7023	Smackover lime or older
NATCHITOCHES PARISH			
W. P. Ryan et al - Lambert No. 1	4-8N-9W	4133	Paluxy
Roy Raines - Prudential Life Ins.			
No. 1	22-10N-9W	1205	Wilcox
RED RIVER PARISH			
Ark. Fuel Oil Co. - Franklin Realty			
Co. No. 1	20-11N-9W	7155	Travis Peak
J. M. Fergotson et al - J. C.			
Marston No. 1	30-14N-10W	1713	Ozan
Glassell & Whitehurst - Lelong No. 1	25-12N-11W	2874	Paluxy
N. W. Hunter - LeLong No. 1	33-12N-10W	2868	Paluxy
Magnolia Pet. Co. - J. C. Pugh No. 59	12-12N-11W	6487	Lower Glen Rose
H. D. Rodgers - Long Bell Lbr. No. 3	30-13N-9W	1623	Annona chalk
SABINE PARISH			
W. L. McClanahan - Frost Lbr.Co.No.1	22-9N-13W	5710	Lower Glen Rose
Albert Reich - Giague No. 1	27-7N-14W	4342	Paluxy
Republic Gas Co.-Whitney Corp. No. 1	8-9N-13W	8929	Travis Peak
Sutton-Zwolle O. Co. - Sabine Lbr.			
Co. No. 1	23-7N-14W	4208	Paluxy
Zwolle Syndicate - Mansfield Lbr.			
Co. No. 1	8-7N-14W	4323	Paluxy
UNION PARISH			
Joe Modisette and Standard Oil Co. -			
Frost Lbr. Co. No. 1	14-21N-1E	9983	Smackover lime
WEBSTER PARISH			
Midstates O Co. - Welori Lbr. Co.No.1	3-20N-10W	8686	Cotton Valley
Magnolia Pet. Co. - Sexton Unit No.1	32-23N-9W	10,462	Cotton Valley or older
A. G. Oliphant - D. W. & E. L.			
Stewart No. B-1	5-20N-10W	9187	Cotton Valley
Sibley-Sabine Corp. - W. M. McDonald			
No. 1	32-17N-9W	6297	Lower Glen Rose
Stanolind O & G Co. - Pardee Lbr.			
Co. No. 1	36-21N-10W	8642	Cotton Valley

COMPANY AND FARM	LOCATION	TOTAL DEPTH	BOTTOM OF HOLE IN
<u>ARKANSAS</u>			
BRADLEY COUNTY			
Phillips Pet. Co. - Marsden No. 1	9-16-11W	5143	Smackover lime
CALHOUN COUNTY			
S. S. Alexander - L. Smythe No. 1	7-11S-14W	3406	Eagle Mills
CLEVELAND COUNTY			
W. E. Allum, Tr. - Moore Est. No. 1	34-9S-10W	3821	Ozan ?
J. T. Marwick & E. O. Olds - Aubry Vance No. 1	18-11S-11W	3561	Tokio
COLUMBIA COUNTY			
Robert Keene et al - Runyon Est. No. 1	1-16S-21W	1008	Basal Wilcox
Kerr-Lynn Oil Co. - Barnett No. 1	14-17S-20W	7730	Smackover lime
E. O. Olds - M. Dennis No. 1	4-17S-21W	4513	Lower Glen Rose
Standard Oil Co. - W. P. Phillips No. 1	15-17S-19W	7603	Smackover lime
Tidewater-Seaboard O. Co. - Beene No. 1	15-18S-19W	8332	Smackover lime
CRITTENDEN COUNTY			
Manning & Martin - Cartwright No. 1	16-7N-8E	4208	Ordovician
Stanley O. Corp. - Danner No. 1	18-8N-9E	3351	Paleozoic
DALLAS COUNTY			
L. S. Gist - J. H. Goodgame No. 1	26-10S-16W	2097	Brownstown ?
DESHA COUNTY			
Columbian Fuel Corp. - V. Cross No. 1	34-8S-3W	4915	Igneous
HEMPSTEAD COUNTY			
H. D. Easton et al - R. M. LaGrone No. 1	5-12S-26W	3511	Eagle Mills
Sheppard-Todd - Smith No. 1	1-11S-24W	2290	Eagle Mills
LITTLE RIVER COUNTY			
Fred Smith - W. D. Waldrop No. 1	4-13S-31W	3431	Basal Travis Peak
LONOKE COUNTY			
Cabot Drlg. Club - Deason No. 1	18-4N-9W	2760	Paleozoic
Frank Silver - Chambers No. 1	17-2N-2W	1644	Paleozoic
Frank Silver - Chambers No. 2	17-2N-2W	1500	Paleozoic
MILLER COUNTY			
Hill & Easterbrook - Sherman No. 1	29-19S-28W	6330	Lower Glen Rose
NEVADA COUNTY			
J. E. Speer, Tr. - Phillips No. 1	18-14S-21W	1476	Arkadelphia
Tex. Canadian O. Co. - Stocks No. 1	9-15S-22W	3654	Travis Peak
Union Drlg. Co. - Fuller No. 1	5-13S-21W	1433	Nacatoch

COMPANY AND FARM	LOCATION	TOTAL DEPTH	BOTTOM OF HOLE IN
OUACHITA COUNTY			
Copenhaver O. Corp. - J. E. Evans No.1	20-11S-19W	1825	Travis Peak
A. H. Tarver et al - J. S. Dean Est. No. 1	16-14S-19W	2225	Tokio
A. H. Tarver et al - Mrs. Guy Smith No. 1	16-14S-19W	2330	Tokio
PULASKI COUNTY			
A. L. Kitzelman et al Fee No. 2	2-1S-13W	4080	Paleozoic
Ozark Nat. Gas Co. - Shropshire No. 1	21-8N-29W	2740	Pennsylvanian
PIKE COUNTY			
Bruce E. Wallace et al - Tilyeu No. 1	26-8S-24W	404? 610?	Paleozoic
UNION COUNTY			
Fohs Oil Co. - Craig No. 1	5-18S-14W	6905	Smackover lime
Joe Modisette et al - Union Saw Mill No. 2	8-18S-12W	6511	Smackover lime
E. G. Bradham - S. L. Robbins No. 1	12-19S-16W	2300	Nacatoch
Suggs et al - Jerry No. 1	28-17S-14W	3480	Travis Peak

Complete Coring Service

the REED KOR-KING CORE-DRILL



- Larger Diameter Cores • Greater Recovery
 - Floating Type Core Barrel and Core Catchers • Core Catcher Protector
- Used on WORLD'S DEEPEST conventional Job—15,004'

the REED WIRE-LINE Coring - Drilling Outfit



- Eliminates Many Round Trips
 - Protects Walls of Hole • Designed For Faster - Better - Economical Coring
- Used on WORLD'S DEEPEST Wire Line Job—13,786'

REED ROLLER BIT COMPANY

P. O. DRAWER 2119, HOUSTON, TEXAS

STAMPS, ARKANSAS



STAMPS, ARKANSAS, the center of the Shallow Oil Field of LaFayette County, Arkansas, extends a cordial invitation to the oil fraternity to come to Stamps to make their home or headquarters.

We have a wide-awake community with good churches, Presbyterian, Baptist, Methodist and Catholic; and high rating public schools with Smith-Hughes and Home Ec buildings, also an up-to-date public library.

Stamps' progressive business houses carry good stocks of the latest merchandise. Excellent banking facilities, featuring modern and courteous service are available. Good local printing office and weekly paper; quick service from daily newspapers; Up-to-date hotel and restaurant service; competent doctors and dentists, and a first class hospital are community assets.

The city is built on a sloping upland with the school plant and teacherage at the top, with beautiful Lake June at the foot and side of town, which is a fine fishing and boating resort. The streets in main part of town are hard surfaced; other streets improved with good gravel which quickly eliminates mud in rainy weather.

Excellent local and long distance telephone service and telegraph service. Best of electric service for power and lighting purposes. Natural gas for heating and cooking. Pure Artesian water service that makes drinking water a pleasure.

A live-wide awake Rotary club for the men, Women's Study club, Music club and Home Ec club for the women. Masonic and Eastern Star lodges.

With the Cotton Belt railroad running east and west and the L. & A. railroad running north and south Stamps is an ideal place to locate oil supply houses and many choice locations are now available.

Highway 82, dubbed the "liquid gold highway" because oil is found all along its route in Arkansas, gives quick transportation by truck or passenger car to all parts of the country.

The Churches, schools, clubs and citizens in general extend to you and your family a royal welcome, and will try to show you that we appreciate you and to make you feel as though you had been reared among us.

STAMPS FIELD, LAFAYETTE COUNTY, ARKANSAS
BY
C. L. MORGAN (1)

HISTORY

The Stamps Field is worthy of special mention, inasmuch as commercial production recently has been discovered, approximately 15 years after the first knowledge was obtained of the general structural conditions of the area.

The Humble Oil and Refining Company determined the existence of favorable structural conditions in the Stamps area while investigating the faulting in Southwestern Arkansas during 1925 and 1926. At this time, 4 shallow test wells were drilled, the information from which proved the general location of the fault. These wells were located low on the structure and did not encounter any appreciable shows of oil and/or gas.

Erwin and Leach and associates during 1934, 1935 and 1936 drilled 3 deeper tests in the same area which previously had been investigated by the Humble during 1925 and 1926. One of these tests, the #3 Bodcau well, located near the NW corner of section 20-T16S-R23W, penetrated all the known producing horizons of Southwestern Arkansas, reaching the top of the Smackover Limestone at depth of 7650 feet. Several oil shows were encountered; salt water was present in each porous horizon which was tested.

Later geophysical work indicated that the high part of the structure was located approximately one mile west of the Humble and the Erwin & Leach tests. In the fall of 1938, the Shell Oil Company and the Ohio Oil Company drilled the #1 Warren Estate well, located in the center of the SE SE of section 13-T16S-R24W. This well was drilled to a total depth of 7420 feet. The fault plane was penetrated at an approximate depth of 3900 feet. In this well approximately 1200 feet of the Glen Rose section was cut out. The top of the Smackover Limestone was encountered at depth of 7173 feet, 475 feet higher structurally than in Erwin & Leach #3 Bodcau well. The Reynolds Oolite had high porosity and good saturation, but the permeability was unusually low. Salt water with small amounts of oil and gas was obtained in all production tests which were made.

The low permeability of cores of the Reynolds Oolite from the Shell-Ohio well may be related to the lithologic character of these cores, which differed from the typical porous oolitic cores of the Reynolds Oolite obtained from wells located in the various Smackover Limestone pools of Southwestern Arkansas.

One explanation, which may be offered as to the factors contributing to the low permeability is the Reynolds Oolite of the Shell-Ohio well is dependent upon an interpretation of the geological structure. It is thought that the faulting of the Stamps structure may have failed to provide an efficient seal against the flow of fluids across or along the fault plane. From a consideration of the amount of downthrow on the north side of the Stamps Fault, porous sands of the Cotton Valley Formation must abut against the Smackover Limestone on the upthrow side of the fault. Leaching and secondary deposition of calcite in the porous Reynolds Oolite on the upthrow side of the fault would eventually detract from its permeable character and change the textural make-up of the rock. The high porosity of Reynolds Oolite cores of the Shell-Ohio well apparently is dependent

upon the small cavities resulting from the differential leaching of the oolites, while secondary deposition of calcite in the original interstices has built up a seal which effectively prevents the flow of fluid through the rock and contributes to the observed low permeabilities.

STRUCTURE

In the early months of 1939, Erwin & Leach obtained a farm-out of shallow rights from the Shell and Ohio, and on April 25th, 1939, completed the #1 Patton well, located in the center of the S/2 of NW NE of section 24-T16S-R24W, as an oil well flowing naturally.

Producing horizon is a porous limestone in the Rodegga Horizon of the Lower Glen Rose Formation. This well flowed 100 bbls. of 41.8 gravity oil in 15 hours through 7/8" tubing choke; C. P. 670#; T. P. 400#.

The Patton well was drilled to a total depth of 3604 feet and was plugged back to depth of 3480 feet. The fault plane was crossed at depth of 2710', cutting out approximately 700 feet of section, inclusive of the lower part of the Gulf Cretaceous and upper part of the Glen Rose formation. The base of the Anhydrite Zone was encountered at subsea depth of -3133 feet, being 77 feet higher structurally than the anhydrite in the #3 Bodcau well. The trace of the fault on the pay horizon is estimated to be located along the north lines of sections 23, 24 and 19. Present information indicates that the production from this horizon will be confined to the north halves of above listed sections, and the productive area may embrace approximately 640 acres.

POSSIBLE PRODUCING HORIZONS

Histories of similar structures in Southwestern Arkansas indicate the possibility of production being found at Stamps in the Nacatoch Sand, in the Buckrange Sand and in the upper and lower Tokio Sands.

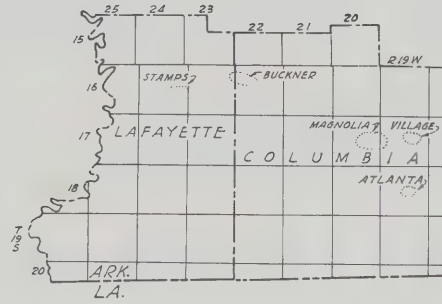
TYPE SECTION
STAMPS FIELD
SCHLUMBERGER- SAMPLES - CORES

STAMPS FIELD

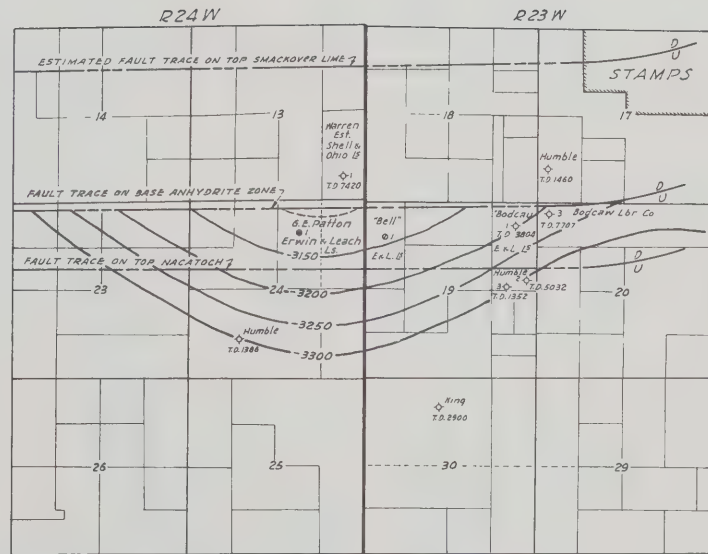
LAFAYETTE CO. ARKANSAS

FAULT DISPLACEMENT

500' ± at 1100'
700' ± at 2700'
1200' ± at 3900'

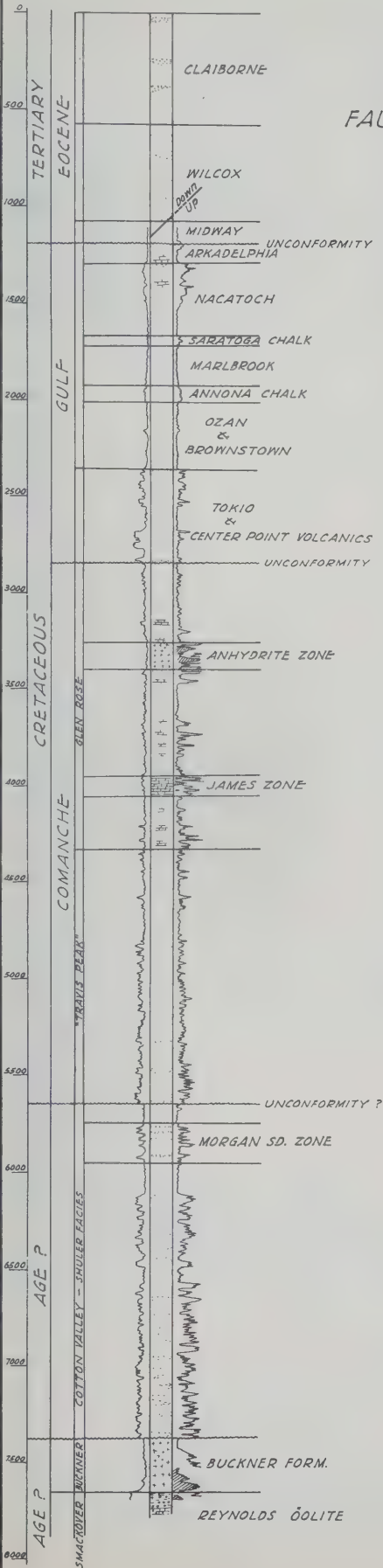


INDEX MAP



CONTOURS ON BASE ANHYDRITE ZONE

CONTOUR INTERVAL = 50 FEET



CITIZENS BANK

Magnolia, Arkansas

Special Officer Delegated to Oil Transactions



Member Federal Deposit Insurance Corporation

LOVE-OWEN

Leases and Royalties

McKay Building

Magnolia, Arkansas



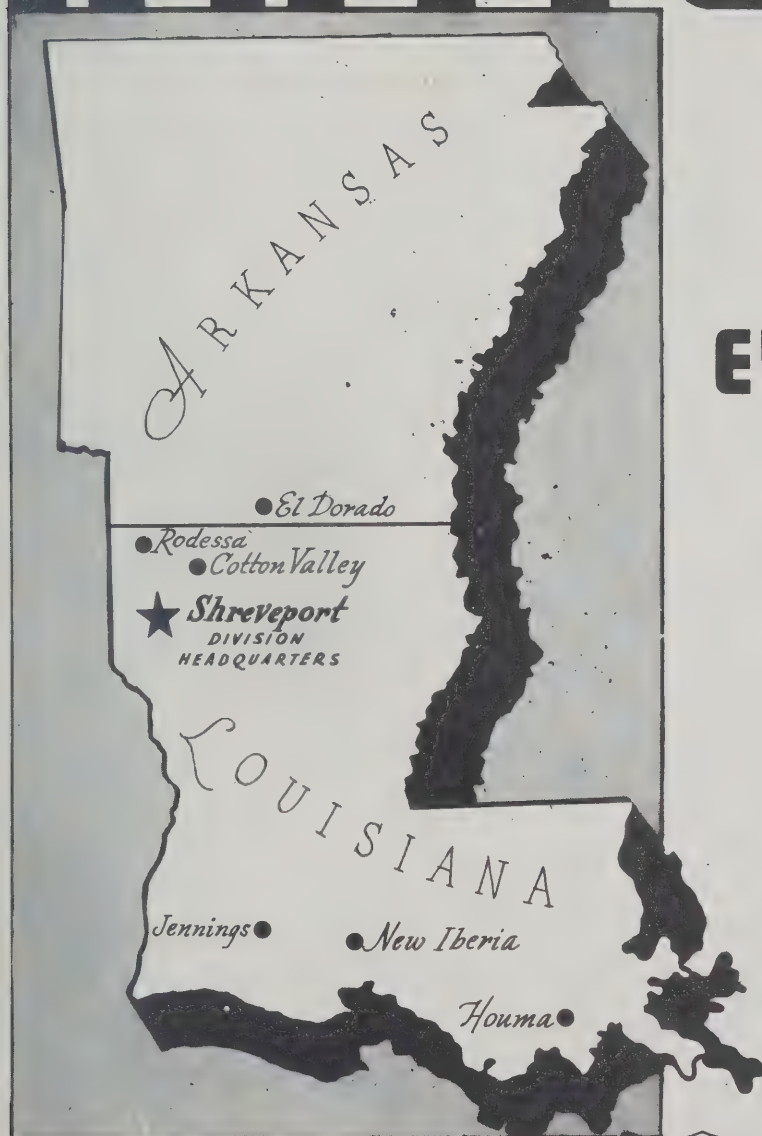
Telephone 208

J. W. LOVE

W. M. OWEN

NATIONAL

**SERVES THE
INDUSTRY IN
EVERY OIL FIELD**



IN ARKANSAS
El Dorado

IN LOUISIANA
Cotton Valley
Houma
Jennings
New Iberia
Rodessa
Shreveport



THE NATIONAL SUPPLY COMPANY

FACTORIES: Springfield, Ohio; Philadelphia, Pa. • SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas

OIL FIELDS OF NORTH LOUISIANA AND SOUTH ARKANSAS
COMPILED BY A. M. LLOYD AND B. W. BLANPIED

This compilation of oil field statistics gives the location in county or parish; date of discovery; gravity of oil; approximate depth to each pay horizon; type of producing rock; formation producing from; with the area of the field and total production to December 31, 1938, for all oil fields in North Louisiana and South Arkansas. Where new fields have not been fully defined, an approximate figure is given representing the writers' opinion of its area when fully developed.

OIL FIELDS OF NORTH LOUISIANA COMPILED BY A.M. LLOYD & B.W. BLANPIED

FIELD	COUNTY PARISH	DATE OF DISCOVERY	GRAVITY OF OIL	DEPTH TO PAY	PRODUCING ROCK TYPE	FORMATION	TOTAL PRODUCTIVE ACREAGE	TOTAL PRODUCTION TO DEC. 31, 1938
BELLEVUE	BOSSIER	1921	20	300-400	SAND	NACATOCH	1020	10,100,000
CADDO DISTRICT	CADDO							
HOSSTON	"	1909	20	1000-1100	"	NACATOCH		
FERRY LAKE	"	1911	43	1750-2200	"	TOKIO-PALUXY		
PINE ISLAND	"	1917	33	1500-1700	CHALK	ANNONA		
PINE ISLAND	"	1917	28	1800	SAND	TOKIO		
PINE ISLAND	"	1920	44	2900	"	L. GLEN ROSE	32000 ±	153,957,000
PINE ISLAND	"	1924	42	3600	OOLITIC L	"		
PINE ISLAND	"	1927	44	3950	SAND	TRAVIS PEAK		
PINE ISLAND	"	1928	40	2800	OOLITIC L	L. GLEN ROSE		
DIXIE	"	1929	42	2100-2400	SAND	TOKIO-PALUXY		
CARTERVILLE	BOSSIER	1929	44	3170	"	TOKIO	1070	1,535,000
COTTON VALLEY								
BUCKRANGE	WEBSTER	1922	30	2500	"	OZAN		14,577,000
TRAVIS PEAK	"	1936	51	5500	"	TRAVIS PEAK		1,896,000
BODCAW SD.(DIST.)	"	1937	62	8200 ±	"	COTTON VALLEY		2,287,000
BODCAW SD.(OIL)	"	1938	39	8600	"	"		97,000
"D" SAND (OIL)	"	1938	45	8500	"	"		153,000
CONVERSE	SABINE	1933	41	1500-1800	CHALK	SARATOGA	1420	1,927,000
ELM GROVE	BOSSIER	1916	30	1550	SAND	OZAN	1010	3,453,000
HAYNESVILLE	CLAIBORNE	1921	35	2800-2850	"	"	6100	68,888,000
HOMER-N. FIELD	"	1919	35	1200	"	NACATOCH	1265	68,270,000
HOMER-S. FIELD	"	1920	35	2030-2100	"	NAC. & OZAN	1390	
HOLLY	DE SOTO	1928	39	2820-2900	"	EAGLEFORD	125	934,000
LISBON	CLAIBORNE & LINCOLN	1936	34	5250	LIME	L. GLEN ROSE	7260	5,723,000
PLEASANT HILL	SABINE	1927	40	3200-3300	SAND	PALUXY	675	1,521,000
R. RIVER-DE SOTO	R. RIVER-DE SOTO	1914	39	2400-2750	"	"	11565	57,315,000
RODESSA	CADDO	1935	43	6050	LIME	L. GLEN ROSE		
RODESSA	"	1935	43	6030	CAL. SAND	"		
RODESSA	"	1935	43	6000	" " "	"	8000	51,855,000
RODESSA	"	1935	43	5900	SAND&LIME	"		
RODESSA	"	1936	40	5825	SAND	"		
SAREPTA	WEBSTER	1922	27	2650-2700	"	OZAN	575	1,526,000
SHONGALOO DIST	"	1938	64	9000	"	COTTON VALLEY	500 ±	40,000
SHREVEPORT	CADDO	1938	44	5550	LIME	L. GLEN ROSE	2600	114,000
SLIGO	BOSSIER	1936	41	5165	"	"	600 ±	501,000
SLIGO	BOSSIER	1938	40	3100	"	U. GLEN ROSE	880	
SUGAR CREEK	CLAIBORNE	1936	32	5600-5700	SAND	L. GLEN ROSE	600	234,000
URANIA	GRANT LASALLE & WINN	1927	21	1500-1550	"	WILCOX	3500	23,292,000
ZWOLLE	SABINE	1928	40	2100-2500	CHALK	SARATOGA	10300	13,966,000
						ANNONA		
						TOTAL		484,161,000

OIL FIELDS OF SOUTH ARKANSAS

ATLANTA	COLUMBIA	1938	43	8200	OOLITIC LIME	SMACKOVER L	500 ±	2,000
BUCKNER	COLUMBIA & LAFAYETTE	1936	34	7200	"	"	1000 ±	361,000
MAGNOLIA	COLUMBIA	1938	38	7500	"	"	1650 ±	104,000
CHAMPAGNOLLE	UNION	1927	32	3000-3400	SAND	TRAVIS PEAK	1850	13,613,000
EAST EL DORADO	UNION	1922	21	2140-2210	"	NACATOCH	1200	9,123,000
EL DORADO	UNION	1920	34	2125-2175	"	"	6680	47,001,000
EL DORADO	"	1922	28	2550	"	OZAN		
FALCON	NEVADA	1938	12	1200	"	NACATOCH	100 ±	
GARLAND CITY	MILLER	1930	32	2900	"	PALUXY	260	1,742,000
IRMA	NEVADA	1923	15	1150-1200	"	NACATOCH	905	6,442,000
LISBON	UNION	1925	33	2100	"	"	2690	6,538,000
RODESSA	MILLER	1937	42	5800	SAND&LIME	L. GLEN ROSE	2000	3,671,000
SCHULER	UNION	1937	40	5550-5740	SAND	COTTON VALLEY	350	1,518,000
SCHULER	"	1937	32	7500	"	"	3455 ±	5,453,000
SCHULER	"	1938	36	7600	OOLITIC LIME	SMACKOVER L	1040	458,000
SMACKOVER HEAVY	UNION & OUACHITA	1922	20	2000-2100	SAND	NACATOCH	16180	
HEAVY OIL	"	1923	21	2250-2350	"	OZAN		
HEAVY OIL	"	1925	21	2350-2450	"	"	6490	318,967,000
HEAVY OIL	"	1925	22	2550-2650	"	TOKIO	7750	
HEAVY OIL	"	1926	29	2675-2800	"	"CONTACT ZONE"	1000 ±	
LIGHT OIL	"	1922	24	2050-2100	"	NACATOCH	2030	
LIGHT OIL	"	1923	25	2250-2300	"	OZAN	9510	53,145,000
LIGHT OIL	"	1923	26	2600-2700	"	TOKIO	550	
SNOW HILL	OUACHITA	1936	46	4900	LIME	SMACKOVER L	500 ±	132,000
STEPHENS	COLUMBIA & OUACHITA	1925	12	1550	SAND	NACATOCH	4680	6,163,000
STEPHENS	"	1922	30	2100	"	OZAN		
TROY	NEVADA	1936	14	1250	"	NACATOCH	200	722,000
"	"	1936	21	2180	"	TOKIO	100	
URBANA	UNION	1929	19	3500	"	L. GLEN ROSE	600	4,540,000
VILLAGE	COLUMBIA	1938	42	7400	OOLITIC LIME	SMACKOVER L	500 ±	67,000
						TOTAL		479,762,000

CRESCENT Drilling Company

812 Ouachita National Bank Building

Monroe, Louisiana

HAROLD L. WOODS, *President*

L. C. DUNCAN, *Treasurer*

Eby Engineering Company

421 Exchange Building

El Dorado

-:-

Arkansas

SAMUEL H. EBY, *Owner*

Specializing in:

Oil Field Surveying

Oil Field Maps

Photo Copies

Schlumberger Log Reproduction

Blue Prints - White Prints - B. & W. Prints - Negatives

BRANCHES

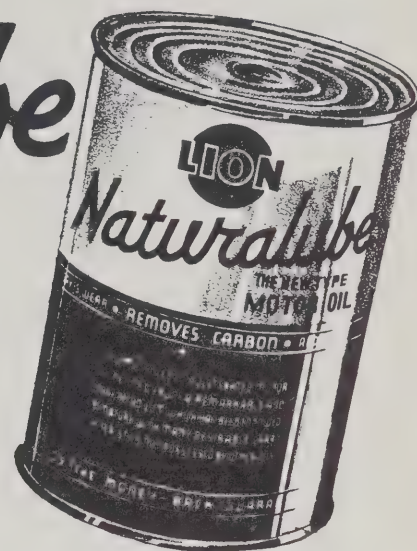
Peoples Bank Bldg.
Tyler, Texas

Randolph Hotel
Henderson, Texas



Naturalube

The New Type Motor Oil



- **RESTORES POWER:**

Removes hard carbon deposits from rings, pistons, valves and spark plugs.

- **SAVES GASOLINE:**

Keeps engine clean of hard carbon deposits and reduces "drag".

- **SAVES MOTOR WEAR:**

Stronger natural protective film prevents excessive motor wear.

MADE EXCLUSIVELY BY

LION OIL REFINING CO.

EL DORADO, ARKANSAS



NORTH-SOUTH CROSS SECTION FROM THE
PALEOZOIC OUTCROPS IN HOWARD
COUNTY, ARKANSAS TO BEAUREGARD
PARISH, LOUISIANA
BY A. M. LLOYD AND ROY T. HAZZARD

This cross section traverses portions of Southwestern Arkansas and North-western Louisiana, from north to south, paralleling the western boundaries of Arkansas and Louisiana. It gives the writers' interpretation of the stratigraphy and structure of the area along the line of traverse and shows the changes in lithology of various formations downdip from the surface or buried outcrops.

Firestone

Auto Supply and Service Stores

Telephone 5161

Crockett and Marshall Sts.

Shreveport, Louisiana

Compliments of

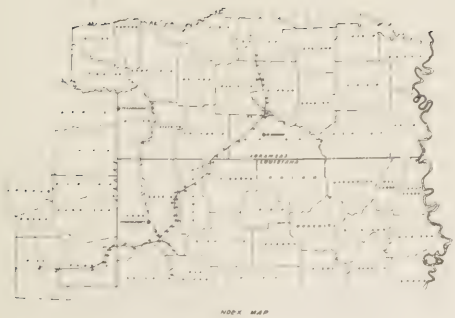
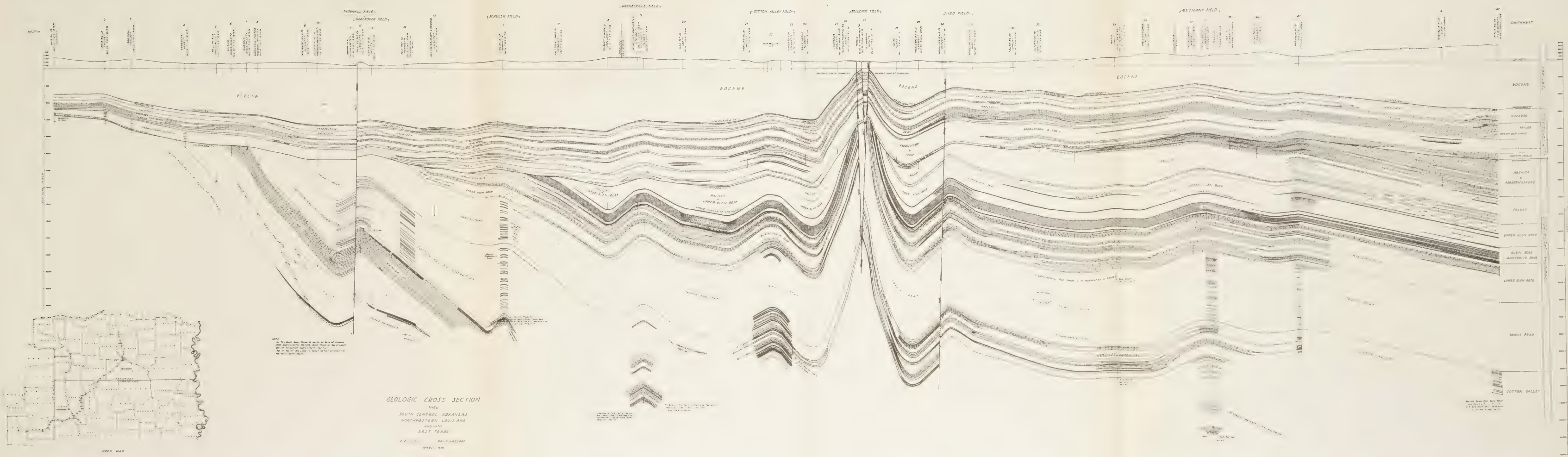
The **Columbia Restaurant**

Shreveport, Louisiana

NORTHEAST-SOUTHWEST CROSS SECTION
FROM DALLAS COUNTY, ARKANSAS THROUGH NORTHWESTERN LOUISIANA
TO RUSK COUNTY, TEXAS
BY ROY T. HAZZARD AND A. M. LLOYD

This cross section traverses portions of South Arkansas, Northwest Louisiana and East Texas, in a direction from northeast to southwest. It gives the writers' interpretation of the stratigraphy and structure of the area along the line of traverse and shows the changes in the lithology of various formations downdip from the surface or buried outcrops.





GEOLOGIC CROSS SECTION
 THIS
 SOUTH CENTRAL ARKANSAS
 NORTHWESTERN LOUISIANA
 AND INTO
 EAST TEXAS
 BY T. HARRIS
 MAP NO. 115

Scale: 1 inch = 1 mile
 1 inch = 1000 feet

Compliments of

**ARKANSAS
PORTLAND CEMENT
COMPANY**



Sales Office: Little Rock, Arkansas

Plant: Okay Junction, Arkansas

Compliments of

The
GARRETT HOTEL

El Dorado, Arkansas

L. O. HUDSON, *Manager*

G. H. VAUGHN

G. H. VAUGHN PRODUCTION CO.

G. H. VAUGHN DRILLING CONTRACTOR

604 Dallas Bank Building

Dallas, Texas

Telephone L. D. 628

Local Phone 2-2684

Big West Drilling Company

H. W. KLINE & G. H. VAUGHN



Address 604 Dallas Bank Bldg.

Dallas, Texas

Telephone L. D. 628

Local Phone 2-2684

GEOLOGY AND DEVELOPMENT OF THE BUCKNER POOL
COLUMBIA AND LAFAYETTE COUNTIES, ARKANSAS

BY
W. K. LINK

Location

The Buckner pool is located on the border of Lafayette and Columbia Counties, Arkansas, centering in Sections 7 and 8, Township 16S., Range 22W.

History

No detailed surface structural surveys were ever made of the area, nor did any of the earlier shallow wells of the area reveal the possibility of structure.

The discovery of the field is the result of a reflection seismograph survey made in 1936. The top of the massive anhydrite of the Glen Rose series was used as the reflecting horizon.

The J. P. McKean #1, discovery well of the field, is located in the center of the SW $\frac{1}{4}$ of the SW $\frac{1}{4}$ of Section 8. Drilling was started in July, 1937, and the well was completed during November, flowing at the rate of 91 barrels per hour through open tubing. The producing formation is known as the Smackover Limestone (sometimes called Big Lime).

Although this well was not the first to obtain production from the Smackover Limestone, it was the discovery well for commercial oil production from the Smackover Limestone. The Phillips' Reynolds well, located in Section 27-15S-15W. at Snow Hill, and the Lion Oil Company's Morgan #A-1, Section 18-18S-17W. Schuler Pool, were gas-distillate producers from the same limestone.

Structure

So far as may be ascertained from the present stage of development, the Buckner field is a symmetrical anticlinal fold with an east-west axial trend. Both the north and south flanks dip approximately 180 feet to the mile and the east plunge is approximately 100 feet to the mile. No western closure has been definitely ascertained from the development to date.

The discovery well was drilled into water, and since this well is the highest structurally drilled to date on the structure, a maximum productive closure of 70 feet is assumed. The field has been defined on the south and southwest by two dry holes. Present information and development indicates an area of approximately 1000 productive acres.

There is no positive evidence of faulting, but a slightly accelerated south dip, and the action of two wells drilled on the south flank, indicate that there may be some strike faulting of minor importance on this flank.

Stratigraphy

The stratigraphy of the area has been ably described by Warren B. Weeks' "South Arkansas Stratigraphy," Volume 22, August, 1938, pp. 953-984.

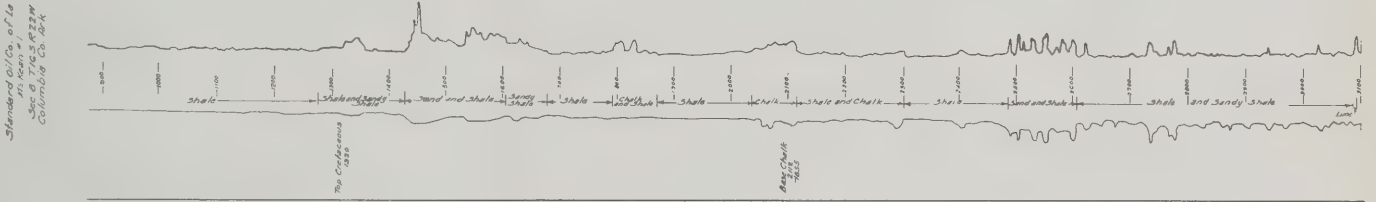
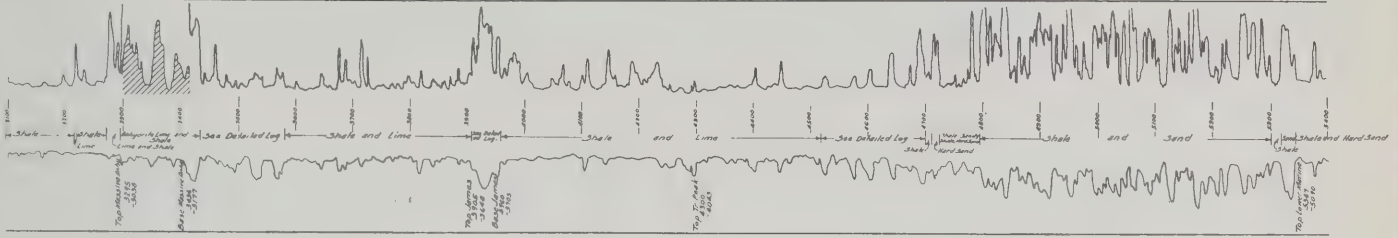
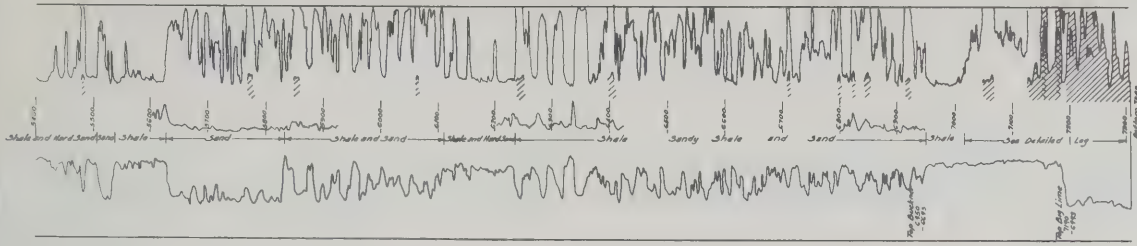
The producing zone of the Buckner Field is considered to be the equivalent of the Reynolds oolitic member of the Smackover Limestone group. Its lithology,

however does not correspond exactly to the lithology of the typical oolitic Reynolds member. At Buckner, the oolites are not as plentiful; are often replaced by cementing material; and the upper 20 feet of porous and permeable limestone have a decided reworked appearance, sometimes approaching a lime breccia in character. This reworked appearance of the upper part of the Smackover lime at Buckner, leads one to suspect the possibility of an unconformity between the Smackover and the Buckner shale-anhydrite zone. A composite columnar section is shown in Figure I.

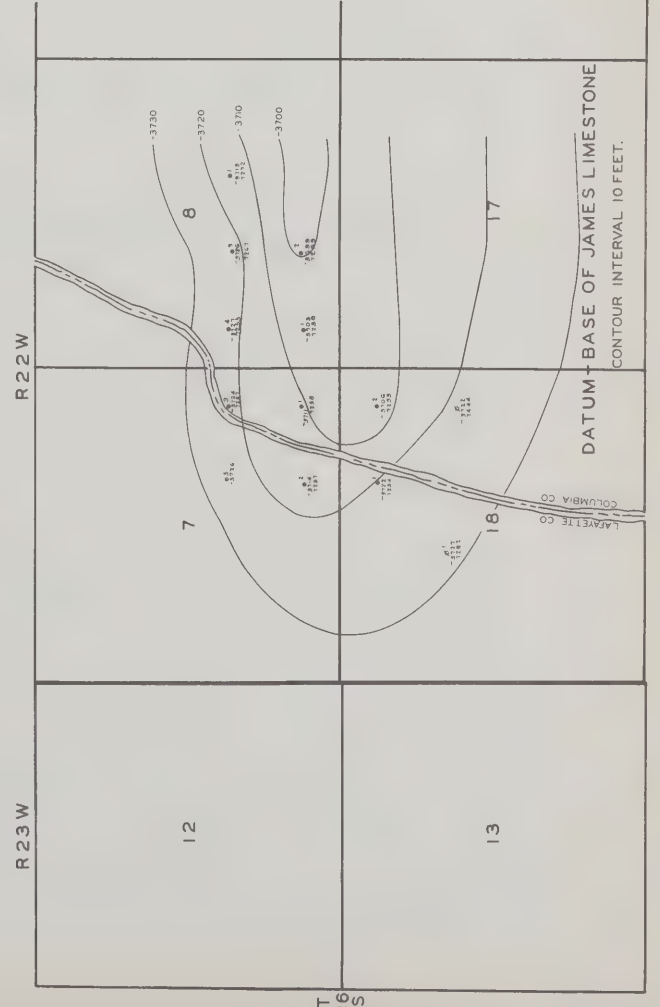
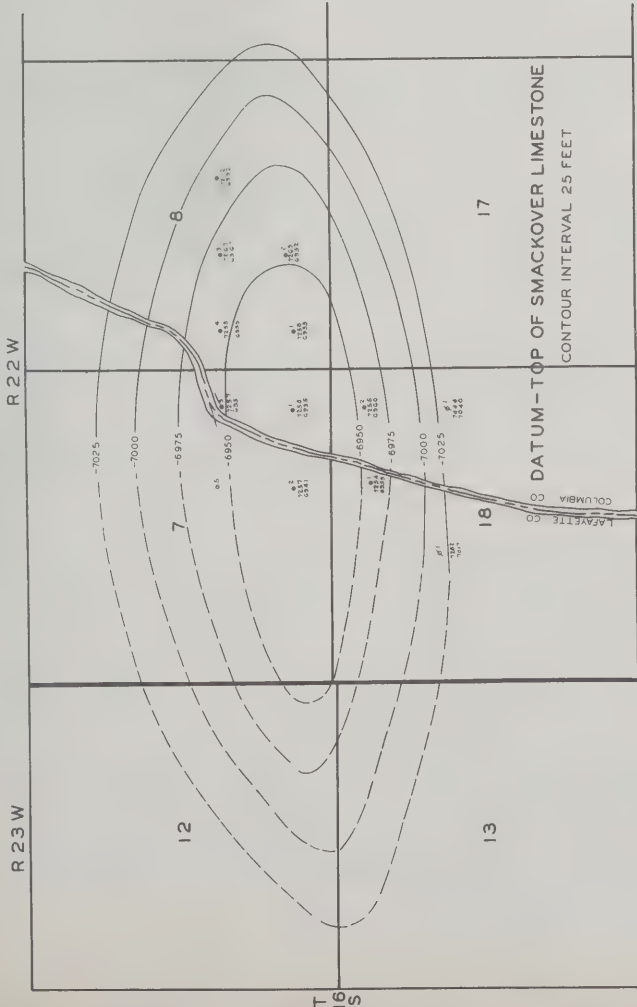
Development

There are now ten producing wells and two dry holes in the field. The dry holes are edge wells drilled too far down dip for production.

Development is controlled by a 40 acre spacing program. Uniform pressure decline in all the wells indicates communication between wells, and points to the existence of an effective water drive on the flanks. It is the intention of the operators to produce the field in such a way as to maintain ample bottom hole pressure for long-lived flowing wells and to prevent if possible the conning of water on the flanks of the structure. This method should insure the maximum recovery which may be expected from the producing formation.



BUCKNER FIELD
LAFAYETTE & COLUMBIA COUNTIES
ARKANSAS



Craig Builders Supply Co.

BUILDING MATERIALS

CEMENT

SAND

GRAVEL

FIRE BRICK

BAROID

AQUAGEL

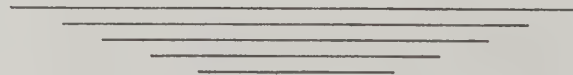
P. O. BOX 65, MAGNOLIA, ARKANSAS

TELEPHONE 385

E. J. CRAIG, MANAGER

ARLINGTON HOTEL

Hot Springs National Park, Arkansas



For Reservation Write

W. E. Chester, General Manager

GEOLOGY AND DEVELOPMENT OF THE VILLAGE POOL
COLUMBIA COUNTY, ARKANSAS
BY
W. K. LINK

Location

The Village pool is located in Township 17S., Range 19W., Columbia County, Arkansas, centering in Sections 9, 10, 15 and 16.

History

Not enough shallow wells had been drilled in the general area from which structure could be ascertained. The area to the west, in which the Magnolia pool is located, gave some indications of structure in the Annona chalk series.

The finding of the Village structure is the direct result of a reflection seismograph survey made in 1937. The top of the James limestone of the Glen Rose series was used as the reflecting bed on which the structure was mapped.

The Standard Oil Company's, W. P. Phillips #1, Section 15-17S-19W, discovery well, was started in February, 1938, and completed in May, 1938, producing at the rate of 76 barrels hourly on 1/2" tubing choke. The producing horizon is the Reynolds oolite member of the Smackover limestone.

Structure

The development of the field to date has been confined to drilling offset wells. Consequently, very little accurate structural data are available at the present time.

The structure appears to be domal in shape with a south flank dip of 180 feet per mile and a west flank dip of 240 feet per mile. The east and north dips have not been ascertained as yet. It is the writer's belief, however, that the structure will cover about 640 productive acres.

The five completed oil wells indicate that the maximum thickness of oil saturated section is 20 feet and that the amount of gas cap varies with the position on the structure. The gas-oil and the oil-water contacts are believed to be horizontal planes with little variation. (See Plate I). One dry hole has been drilled on the west side of the pool.

Stratigraphy

For the general stratigraphy the writer again refers to the paper of Warren B. Weeks "South Arkansas Stratigraphy," Volume 22, August, 1938, pp. 953-984.

The producing zone is the Reynolds oolite member of the Smackover limestone. In this area this zone is an oolitic limestone, the texture of which, from the standpoint of reservoir characteristics, is similar to that of a sandstone with well rounded, sorted and clean grains. The oolites are uniform in size, solid and loosely cemented so that in a dry sample the rock can be rubbed down to nothing but individual oolites. Because of this characteristic the producing zone here is highly porous and permeable.

In this field there is some evidence for an unconformity between the Reynolds

oolitic lime and the Buckner formation. The most obvious unconformity is at the Buckner formation-Cotton Valley contact. (See Plate I for Section).

Development

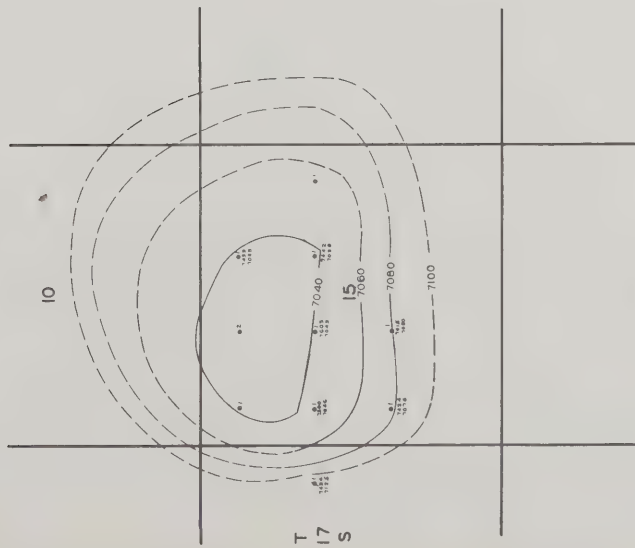
There are now five producing wells in the field and one dry hole. The highest well structurally is the east offset to the discovery well, which is only five feet higher on the base of the Buckner anhydrite. The lowest well is the J. J. Gunnels #1, center of the SW of the NE of Section 9. Two wells, one in the NW of SW, and the other in the NE of SW, indicate that production will not extend south of these wells.

Development so far has been carried out on a forty acre spacing program which is quite ample for the thickness of the producing formation and the porous and permeable nature of the reservoir. Because of the small thickness of the oil saturated section and its permeability, great care must be taken in the completion of the wells. Excessive production must be avoided to prevent the pulling down of the gas cap or the coning of bottom water.

VILLAGE FIELD
COLUMBIA CO. ARK.

Standard Oil Co. of L.P.
Phillips No. 1
Sec. 15 T. 17 S. R. 19 W.
Columbia Co. Ark.

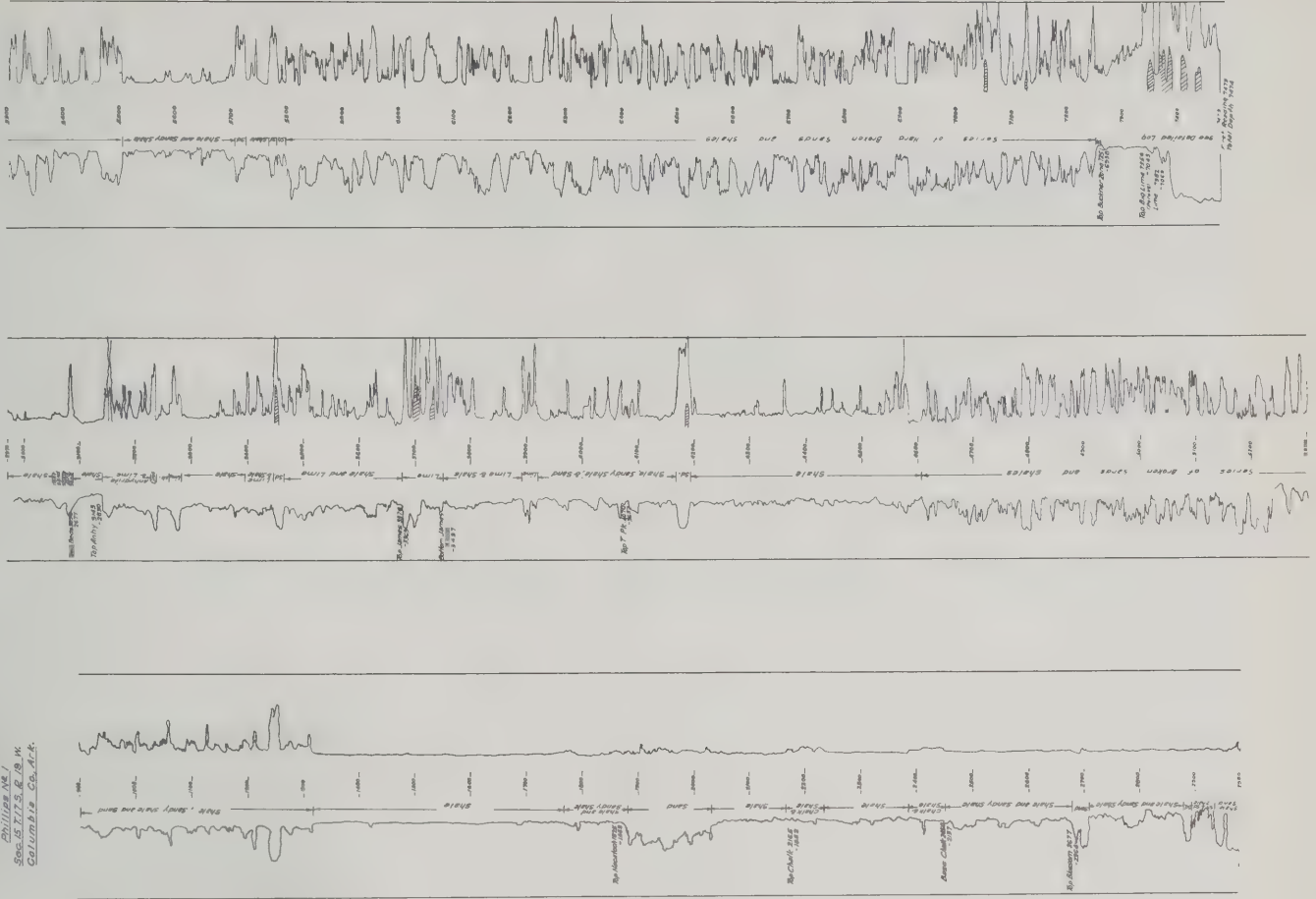
R. 19 W.



22

DATUM - TOP OF SMACKOVER LIMESTONE

CONTOUR INTERVAL 20 FEET



Compliments of

YARBROUGH GUNS CO.

PERFORATING GUNS

WATER LOCATOR

GEOGRAPH

for

SAFETY---MAXIMUM-PENETRATION

24 Hour Service Ark-La-Tex Area

Phone 2368, El Dorado, Ark.

El Dorado Lumber Company

"One Foot or a Million"



Visit Our Complete Wood Working Shop.
Surveyor Stakes, Truck Beds and All Kinds of Truck and
Body Repairs.

El Dorado
Phone No. 2

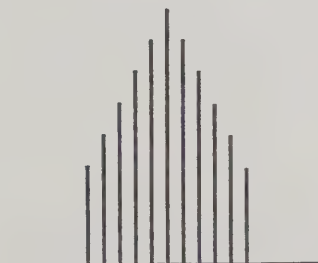
Smackover
Phone No. 83

Schuler
Phone No. 2

F. W. MARTIN & CO.
ROTARY DRILLING
LEASES AND ROYALTIES



FRITZ W. MARTIN
President



Ricou-Brewster Bldg.

Shreveport, La.

DEEP DRILLING PRACTICES IN SOUTHWEST ARKANSAS

BY

L. M. CROW (1)

Deep drilling has come into the spot light in Southwest Arkansas since the discovery of oil in the Smackover Limestone by the Phillips Petroleum Company in its Reynolds No. 1 well, located in Sec. 27, Twp. 15N, Rge. 15W., Ouachita County, Arkansas. This well, located in the Snow Hill area, on the northeast edge of the old Smackover shallow oil district, was completed May 18, 1936, at a total depth of 4926 feet, having topped the Smackover Limestone at depth of 4908 feet. Since that time a number of wildcat wells in Southwest Arkansas have been drilled into the Smackover Limestone, resulting in the discovery of five new fields. These discoveries necessarily have brought about an extensive drilling campaign in these areas. The five new fields were discovered in the following order: Schuler, Buckner, Magnolia, Village and Atlanta.

CASING PROGRAM

The Smackover Limestone, in these new fields, is encountered from depths of 7200 feet to 8200 feet. Dependent upon the depth of this formation the following casing program is usually followed: Approximately 200 ft. of lapweld, 16" or 13-3/8" surface casing; 2100 to 2500 feet of 10-3/4", 40.50#, Grade C, or 9-5/8" 36#, Grade C, for the intermediate or protective string; and 7" O. D., 26#, Grade D, or 6" O. D., 17#, Grade D, or 5-1/2", 17#, Grade D, for the production string. The operators, who set 16", 10-3/4", and 7" O. D. casing, usually drill 20", 15" and 9-7/8" holes respectively. Those, who set 13-3/8", 9-5/8" and 6" or 5-1/2" O. D. casing, drill 17 1/2", 12 1/4" and 8-5/8" holes. The following table summarizes the casing program used:

<u>SURFACE CASING</u>	<u>INTERMEDIATE STRING</u>	<u>PRODUCTION STRING</u>
16" Lapweld	10-3/4", 40.50# Grade C	7" O. D. 26# Grade D
13-3/8" Lapweld	9-5/8" 36# Grade C	(6" O. D. 17# Grade D 5 1/2" O. D. 17# Grade D

DRILLING EQUIPMENT

All of the deep drilling in Southwest Arkansas has been done with heavy duty rotary equipment. Most of this drilling has been done with steam driven equipment, however, a few of the wildcats, due to their remote location from gas mains, have been drilled with rigs using internal combustion motors as prime movers. A steam driven rig usually consists of the following equipment:

- 3 125 H. P., 300 lb. Working Pressure boilers,
- 1 12" X 12" Twin cylinder drilling engine,
- 1 Set Unitized Heavy Duty Draw Works, usually equipped with a Hydro-matic brake. Some of the hoists used are Ideal #34-9 SOU. with six speeds and 9" shafts, Emsco 6 speeds 9" shaft and Ideco C-10271 with 3 speeds and 10" shafts.

(1) Crow Drilling Company, Shreveport, Louisiana.

- 2 14 $\frac{1}{2}$ " X 7 $\frac{1}{2}$ " X 18" or 15 $\frac{1}{2}$ " X 8 $\frac{1}{2}$ " X 20" Duplex slush pumps. One pump usually does most of the work with the other used for a stand-by; however, they are usually connected so they can be run compounded if desired. Heavy Duty, five-sheave travelling and crown blocks, a 300 ton capacity hook, a swivel, and other heavy duty equipment complete the rig.

The three 125 H. P. boilers operating twenty four hours per day consume approximately 750,000 cu. ft. of gas. The amount used varies from a low of approximately 500,000 cu. ft. to a peak load of 1,000,000 cu. ft. Gas sells for 10¢ per M cu. ft. in this general area, which makes the fuel cost \$75.00 per day. Calculated on an average of 30 to 35 fuel consumption days the fuel cost would approximate \$2,500 to \$2,600.00 per well. In the Village Field the wells produce sufficient gas under present allowables to furnish fuel for drilling, thereby eliminating this item of cost, and giving the steam rigs a decided advantage in this locality.

The motor driven rigs consist of two types, viz; Directly driven mechanical rigs and mechanical electric rigs. The first type uses internal combustion motors burning either Diesel Oil or butane Gas, directly connected to the draw works through a reversible clutch or a variable speed gear box and employing a direct drive to the slush pump. The motors are always set in tandem with a compounding hook-up so that both motors, or either motor, can drive either the draw works or the slush pump. The motors are usually 225 H. P. which turn up to approximately 1000 R. P. M. The slush pump used is usually a 7-3/4" X 18".

The mechanical electric rigs employ internal combustion engines, either Diesel or butane, to pull a D. C. Generator. This generates the electricity for the D. C. electric motors which pull the draw works and pumps. One rig of this type, located in this area, uses two 8 cylinder Diesel motors with 9" bore and 12" stroke, rated at 350 H. P. at 600 R. P. M. These motors pull two 350 H. P. generators which furnish electricity for two 200 H. P. motors on the draw works and for one 300 H. P. motor which pulls the 7-3/4" X 18" slush pump.

The motors used on the above types of rigs use approximately \$15.00 to \$20.00 worth of fuel per 24 hour day, and \$7.00 to \$8.00 worth of lubricating oils and greases, making a total cost for fuel and lubricants of approximately \$25.00 per day. These rigs have taken, to date, from 60 to 65 drilling days to complete a well, making a total cost for fuel and oil of approximately \$1,500.00. This effects a fuel saving over the steam rig of \$1,000.00, but the added expense caused by extra drilling time more than nullifies this saving. Due to the reduction in drilling time the steam rigs are doing all of the development drilling and most of the wildcatting.

The majority of the operators are using 136 foot steel derricks with a 26 foot base, having a rated capacity of 645,000 lbs., on a 7 foot steel substructure. This derrick offers a large safety factor in case of stuck drill pipe or casing where it is necessary to place a heavy load on the derrick; and the substructure materially reduces the cellar cost.

DRILL PIPE, LINES, ETC.

Most of the operators use 6-5/8" O. D., 25.20# drill pipe with 7-3/4" O. D., A. P. I. regular tool joints in drilling the hole for the surface and intermediate strings of casing. This drill pipe is then laid down and 4 $\frac{1}{2}$ " O. D., 16.60#, Grade D is used for drilling from the 2100-2500 foot depth to the Smack-

over Lime. This program places the burden of the drilling on the $4\frac{1}{2}$ " O. D. drill pipe. The common practice is to use $5\text{-}3/4$ " O. D. full hole tool joints on this string, however, some operators are using $6\text{-}1/8$ " O. D. internal flush tool joints. The full size opening through the tool joint results in less friction loss in the mud and gives more pressure on the drill bit, however, the large O. D. of the tool joint causes it to wear excessively, especially in drilling the $8\text{-}3/4$ " or $8\text{-}5/8$ " diameter holes. Therefore most of the operators prefer the $5\text{-}3/4$ " O. D. joint.

A 30 foot drill collar and two single stage, three point reamers, one below and one above the drill collar, are run on the bottom of the string. Some, however, are now using tandem 30 foot drill collars in order to get all the weight necessary for drilling concentrated in the drill collars. This eliminates the necessity for using the weight of the drill pipe on the bit and keeps most of the string in tension, thereby reducing the wobble of the drill pipe in the hole and saving tool joint and pipe wear by lessening the friction between the pipe and the formation.

All of the rigs use some form of blow-out preventers. Most are equipped with pressure operated, ram type, 6000# test, preventers. This type of preventer has interchangeable rams to fit the $4\frac{1}{2}$ " O. D. drill pipe and the 7" O. D. or 6" O. D. casing. The blow-out preventing equipment is installed on the intermediate string of casing.

Drilling-in is ordinarily done with $2\frac{1}{2}$ " O. D. External Upset 6.5# tubing, which is later used in the well. In some cases the drilling-in is eliminated by the method of setting casing through the pay and gun perforating at the saturation level.

All operators use $1\text{-}1/8$ ", 6 X 19, Right Lay wire rope for drilling lines. Some use rope with hemp center cores and others use rope with independent wire rope centers. Both give equally good service and since the hemp center is less expensive it is more commonly used.

For the actual drilling all operators string six lines but in setting the 7" O. D. casing eight lines are strung. It requires 1250 feet of wire rope to string six lines and 1550 feet to string eight lines. Most operators are using a 1550 foot length cable, keeping the extra line spooled and using it only when the eight lines are strung to set the casing. Where the casing program calls for 6" O. D. or $5\frac{1}{2}$ " O. D., 17# casing for the production string, the load to be handled in setting this casing is no more than that encountered in handling the $4\frac{1}{2}$ " O. D. drill pipe. Since the drill pipe is always handled with only six lines it becomes unnecessary to string the additional two lines to run casing. In such cases a 1250 foot line can be used, thus materially reducing the wire line cost. The normal expectancy in this area is two holes per line. The 1250 foot line after making one well is strung up backwards on the second well in order to place the unworn portion, used for the dead line end on the first well into the fast line position on the second well. This practice equalizes the wear on the line.

DRILLING CONDITIONS

The formations encountered in drilling to the Smackover Lime in Southwest Arkansas are readily drilled by the rotary drill bit. This is especially true of the sediments down to the Annona Chalk. These are easily drilled with a drag type bit. The first 2100 feet under the surface string is usually drilled in 18

to 24 hours. After the protective string of casing has been set most operators use only rock bits in drilling to the Smackover Limestone. The accompanying chart, Fig. 1, shows the drilling time, number of bits used, mud weight and viscosity maintained and straight hole surveys of a typical Southwest Arkansas operation.

It usually requires from 25 to 35 drilling days and from 28 to 35 bits to drill a hole in this territory to the Smackover Limestone level.

Mud weights and viscosity are maintained only high enough to prevent the hole from caving and to keep the thickness of the mud cake at a minimum. If the mud weight is kept around 9.7 to 9.8 lbs. per gal. with a viscosity of 20 points, gradually increasing in weight, but not to exceed 10# on bottom, little trouble is had with the hole. However, if the mud is allowed to rise above 10# the pressure exerted by this column of mud fluid will cause water to be filtered from the mud into the porous sands of the Lower Marine section and deposit a thick mud cake on the walls of the hole. This creates a hazard in going in and out of the hole with the bit and especially in running casing. Therefore it is extremely important that the mud should be watched closely and kept at the proper weight and viscosity. This weight and viscosity can usually be maintained with the native mud, however, it is sometimes necessary to use artificial mud.

STRAIGHT HOLE SURVEYS

Due to the comparative flatness of the sediments in this area little trouble is had in the drilling of straight holes. The majority of the holes are less than 2 degrees off the vertical at any point and many are less than 1 degree off. The holes are surveyed only for amount of inclination, no operators troubling to make directional surveys. The straight hole tests are either run on a Halliburton wire line or the instrument is dropped into the drill pipe onto a baffle plate before pulling the drill pipe out of the hole to change bits. The latter method is preferable because it saves time as it is not necessary to leave the drill pipe "still" for period of over 10 minutes in taking the survey. This reduces the hazard of stuck drill pipe.

DRILLING COSTS

Drilling costs have been materially lowered during the past two years in this general area due to the operators and drillers becoming more familiar with drilling conditions, thus decreasing the occurrence of stuck drill pipe and costly fishing jobs. While costs, of course, vary from well to well the average drilling cost is now approximately \$3.25 to \$3.75 per foot where no serious trouble is encountered. The contractor furnishes fuel and water. Shown below are the main items of cost on a typical Southwest Arkansas operation.

STANDARD OIL CO. OF LA.
SEC. 18-16-22
J. L. WARREN No 2
COLUMBIA CO. ARKANSAS
DRILLED BY CROW DRILLING CO.

Drilling Record

Bit Record

Mud Record

Slope Tests

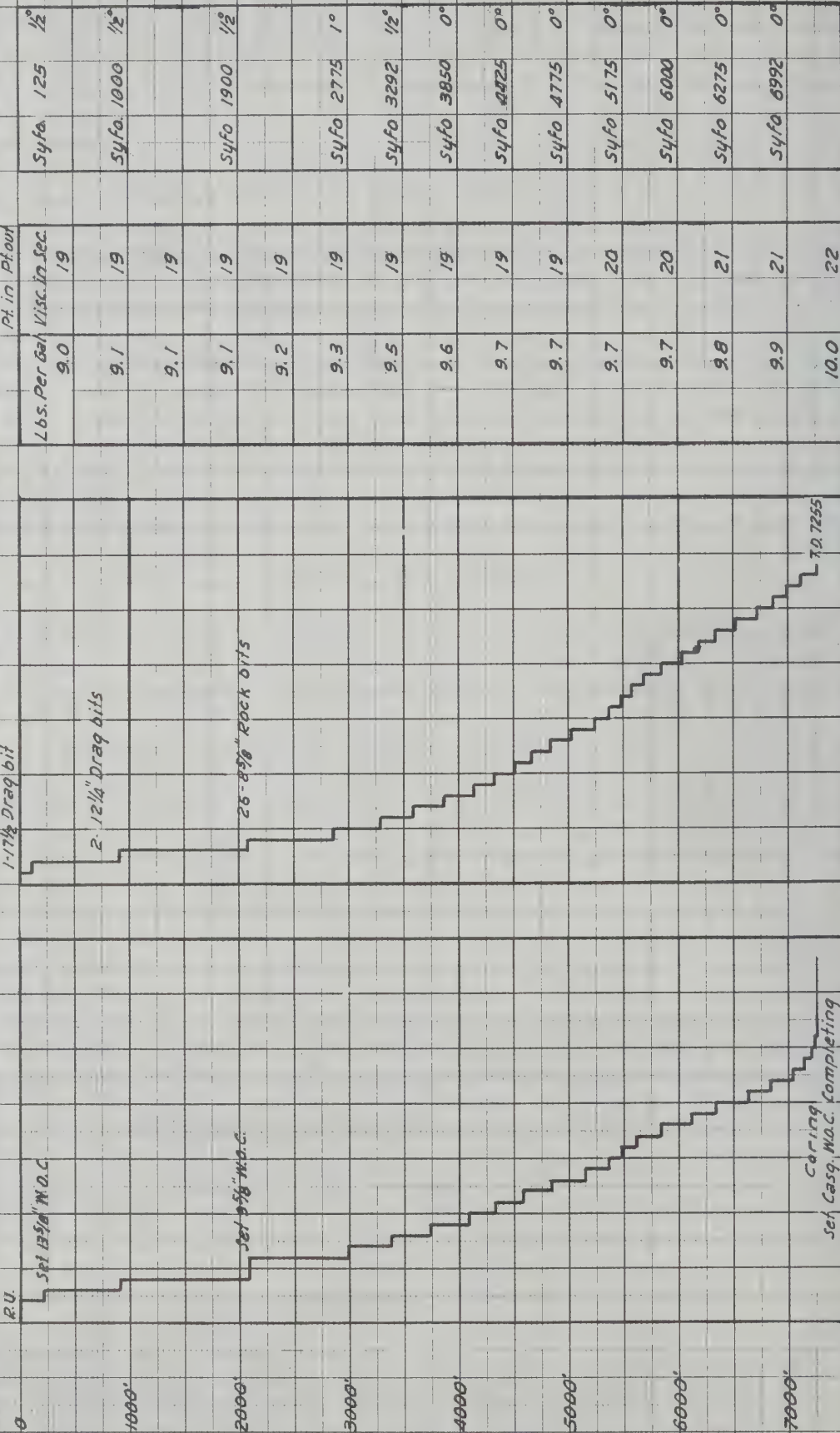


FIGURE 1

Labor - 40 days @ 150.00 per day, incl. taxes & insurance	6,000.00
Digging Pits, Erecting & Dismantling Derrick	1,150.00
Rig Supplies, Replacements, etc.	3,000.00
Bits - 4 Drag Bits, 35 Rock Bits	3,500.00
Fuel - 35 days, 750 M.C.F. @ .10¢	2,625.00
Water - Varies with source	500.00
Teaming & Trucking	1,000.00
Shop Work & Welding	1,000.00
Superintendence	200.00
Miscellaneous	1,500.00
Depreciation of Equipment;	
Rig - \$75,000.00 @ 12½% per annum	1,500.00
Drill Pipe - \$25,000.00 @ 100% per annum	4,000.00
Total	25,975.00

(Actual cost for a 7500 foot hole would be \$3.46 per foot).

For the past three years Southwest Arkansas has undergone detailed geo-physical exploration in order to locate structural conditions favorable for oil accumulation. This work has resulted in the discovery of several fields producing from the Smackover Limestone and many other structures so located remain to be tested. Operations in Southwest Arkansas are at present somewhat curtailed due to the economic difficulties experienced in successfully meeting the competition of the comparatively cheap crudes of East Texas and the shallow, flush fields of Illinois.

UNIBOLT

COUPLINGS • ADJUSTABLE AND POSITIVE FLOW CHOKES

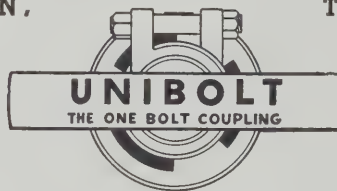
HIGH - PRESSURE STEEL CHRISTMAS TREE FITTINGS

FLEXIBLE BALL JOINTS

THORNHILL-CRAVER COMPANY, INC.

HOUSTON,

TEXAS, U. S. A.



SHREVEPORT PHOTO COPY CO.

Schlumbergers Shot To Scale

BLUE PRINTS

PHOTO COPIES

ALL WORK STRICTLY CONFIDENTIAL

Immediate Service

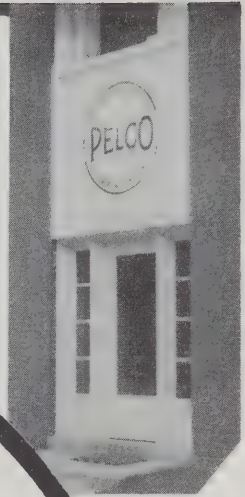
Quality Work

208-210 Ricou-Brewster Bldg.

Phone 2-8737

Shreveport, La.

PELCO is the symbol of a strong link forged in the chain between geophysical exploration and profitable production.



PELICAN
WELL TOOL & SUPPLY CO.
SHREVEPORT • LOUISIANA

Monroe—Lake Charles—New Iberia—
 Houma—Greggton—Magnolia—Cotton
 Valley—Converse—Houston.

WALDO COLUMBIA COUNTY, A R K A N S A S

A CITY OF BETTER HOMES

*Within a Few Minutes Drive of All New Oil Activities in
Southern Arkansas*

Our Chamber of Commerce is anxious to cooperate with
Firms and Individuals desiring to locate in this area.

*Loading Facilities on the main line of the
Cotton Belt Railroad*

*Located on
U. S. Highway 82*

Chamber of Commerce

WM. FINCHER, Secretary



NORTHEAST-SOUTHWEST CROSS SECTION
CLEVELAND COUNTY, ARKANSAS TO WEBSTER
PARISH, LOUISIANA
BY
JOSEPH PURZER

The accompanying generalized cross section portrays the author's conception of the regional stratigraphy and structure of the pre-Tertiary embayment formations of South Arkansas and North Louisiana. Painstaking study of well samples has furnished the groundwork on which the section has been constructed.

Due to space limitation it has been found desirable to omit from the cross section the formations which occur above the minus 1000 foot contour. For an excellent recent discussion of the lithologic details of the strata depicted, as well as those omitted from the section, the reader is referred to W. B. Weeks' valued paper on South Arkansas stratigraphy which was published last year in the Bulletin of the American Association of Petroleum Geologists (volume 22, No. 8).

It is the purpose of the author to present in the cross section and in this discussion only the salient features of the structure and stratigraphy of the area studied. Lithologic details and the smaller structural irregularities have been intentionally omitted. Correct stratigraphic placing of each of the oil bearing beds of the Ark-La-Tex region is a major objective in this work.

UPPER CRETACEOUS. The Gulf series includes all the formations between the basal Eocene Midway formation and the top of the Lower Cretaceous or Comanche series. As the contact between the two series is one of unconformity the basal Gulf formation lies on successively older Comanche beds until, in the northeastern end of the cross section, it rests on the eroded edges of the steeply folded Pennsylvanian or Mississippian formations of the Ouachita mountain system. Due to progressive northward truncation nearly 10,000 feet of pre-Gulf strata are absent at this point in the section.

The thickness of the Gulf series increases from 800 feet in the northeastern part of the section to 1800 feet in the southwestern portion. Upper Cretaceous formations of importance as reservoir rocks in the oil fields of Arkansas and Louisiana, named in descending order, are the Nacatoch sand; the Ozan formation which contains the Graves, Meakin and Primm sands of the Smackover field; and the Tokio formation which has been incorrectly identified with the Woodbine by Louisiana drillers. The Tokio rests unconformably on a lithologically variable formation consisting of red shales, sands and bentonitic material which has been called the "Bingen" but which closely resembles the Woodbine formation of the east Texas basin.

In northern Calhoun County a relatively sharp flexure of the Paleozoic floor produces an apparent east dip in the line of section.

COMANCHE. The important subdivisions of the Lower Cretaceous series which appear on the cross section are (1) the Paluxy non-marine formation which contains sands that are productive of oil in various fields; (2) the Upper Glen Rose marine limestone and shale member; (3) the Glen Rose anhydrite, an easily identified and therefore valuable marker for geologic mapping where present; and (4) the Lower Glen Rose which contains the Rodessa and Pine Island zones that are prolific oil reservoirs in the Ark-La-Tex area. The basal portion of the Rodessa zone is commonly called the Young horizon or the James limestone. Pettit is a synonym for Pine Island zone.

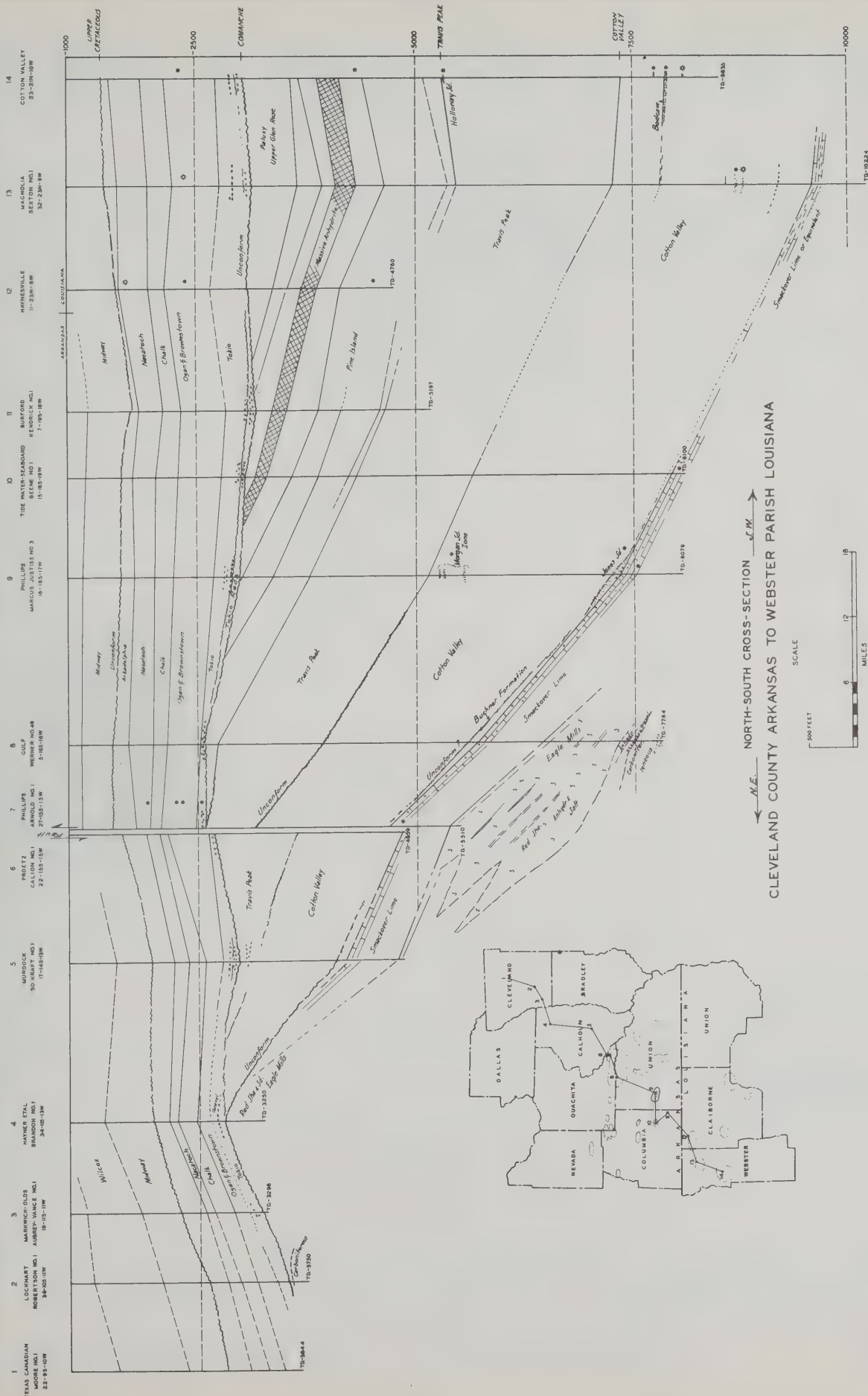
TRAVIS PEAK. Two thousand feet of non marine red sediments are found below the Glen Rose of Louisiana. In Calhoun County, Arkansas, these beds disappear beneath overlapping Cretaceous strata. The term Travis Peak is applied to these sediments but their exact correlation, as well as that of all the underlying embayment beds, has not yet been worked out. Oil sands occur within the "red beds" in Arkansas and Louisiana.

COTTON VALLEY FORMATION. In northern Louisiana the "red beds" are succeeded by 2300 feet or more of marine shales and thin sandstones. Several important oil and gas bearing sands are included in this formation in the Cotton Valley field of Louisiana, where the formation takes its name, and in the Schuler field of Arkansas. The marine character of the beds becomes less apparent northward and the sands themselves, which are quite uniform in Louisiana, become lenticular in Arkansas. Northward truncation causes the formation to disappear beneath the Cretaceous overlap in Calhoun County. In the southwestern part of the line of section the Cotton Valley formation is thought to lie on the Smackover limestone or its equivalent; northward it overlaps the Smackover limestone and lies unconformably on the Eagle Mills beds. At the base of the Cotton Valley formation in Arkansas and eastern Louisiana occurs a zone of red shale, anhydrite and dolomite which has been named the Buckner formation. In the Schuler field the Buckner beds are replaced by a thick, rich oil sand which lies directly on the Smackover limestone.

SMACKOVER LIMESTONE. The Smackover limestone becomes shaley to the southwest. Normally its upper portion is oolitic and porous. Updip however it thins rapidly and its porosity is reduced. Prolific oil fields in south Arkansas have been discovered in the porous oolite at the top of the formation.

EAGLE MILLS FORMATION. Only a few wells in a small area have penetrated below the Smackover limestone. Red shales and a thick salt deposit underlying the Smackover limestone make up the Eagle Mills formation in southern Calhoun and northern Union counties of Arkansas, but, again in looking northward we see a rapid thinning, the early disappearance of the salt and the ultimate wedging out of the entire formation between the Gulf Cretaceous and the Paleozoic floor.

A lengthy history of uplift, erosion, downwarp and deposition, several times repeated, is indicated in this cross section which traverses an area that until quite recently was virtually unknown geologically.



ARE YOU A SHERLOCK HOLMES

?



CRAFTSMANSHIP

Why not examine us under your magnifying glass and let us prove to you that specialized skill supplemented by the very finest mechanical aids can produce unsurpassed CRAFTSMANSHIP printing.



We are adequately prepared to fully serve the needs of the oil and related industries with our large and modern printing and lithographing plant.

Quantity reproduction of maps and blue prints is one of the many phases of service we render—but don't forget whether it's a fine book or a small memo pad you want, the Journal can always supply your needs.

JOURNAL PRINTING CO.

Printers - Lithographers

Telephone 2-0381

Shreveport

THE SHREVEPORT OIL FIELD
CADDO PARISH, LOUISIANA

BY

S. E. MIX AND J. T. MCGLOTHLIN

The Shreveport Oil Field was discovered by R. E. Allison with the completion of his Ellerbe et al #1 well, located in section 27-T18N-R14W., in Caddo Parish, on July 18, 1938. The initial production of this discovery well was 491 barrels of 43.8 gravity sweet oil in the first 24 hours through 1/4" tubing choke. The producing horizon is the Pettit oolitic lime of the Lower Glen Rose formation. Top of the producing horizon was penetrated at a depth of 5546 feet.

The writers are indebted to the officials of the Gulf Refining Company for permission to publish this report and for the use of data in the files of the Company for the construction of the map. Acknowledgment is given to Mr. E. F. Warren, Jr. for accurate data on depths of the top of the oolitic lime based upon his examination of cores on the derrick floor.

The accompanying subsurface structural map is contoured on top of the Pettit oolitic lime. It shows that the center of the producing area is only a short distance to the north of the city limits of Shreveport. Several wells have been completed within the city limits. The drilling of town lots and small tracts is precluded, however, by the 40 acre spacing order of the State Conservation Department.

Wells are completed at reasonable cost on account of the proximity of roads; the accessibility of water, and of gas for fuel. The average length of time for well completion is 25 to 30 days.

The present producing wells of the Shreveport oil field lie to the north of the old shallow Shreveport Gas Field, which produced gas from both the Nacatoch sand and from the contact zone of the Upper and Lower Cretaceous. (1)

The generalized stratigraphy of the rocks penetrated in the Shreveport field is shown by the electrical log reproduced on the edge of the structural map.

A brief summary of the geologic section penetrated follows:

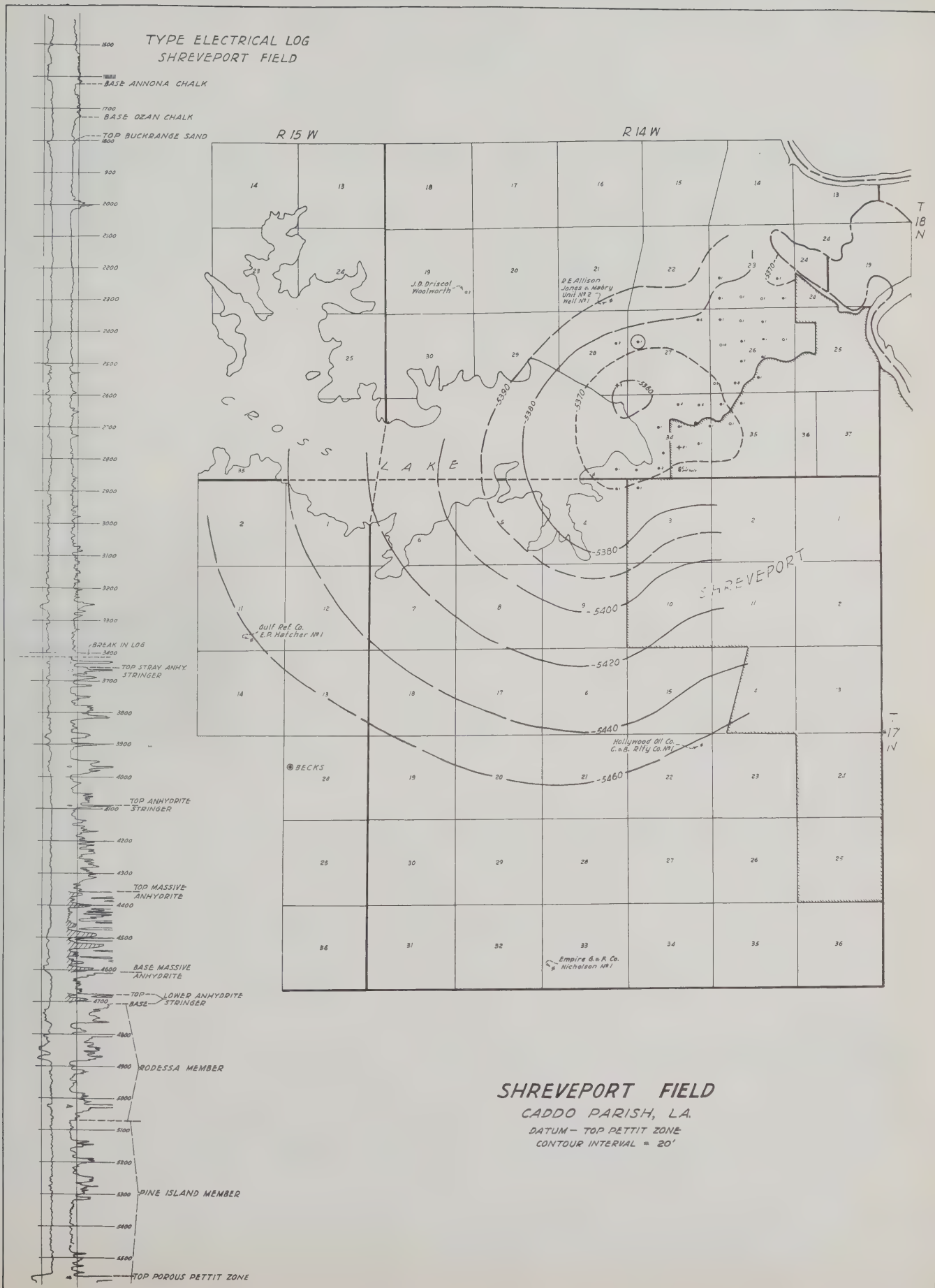
Eocene	Wilcox (surface formation)
	Midway
Gulf Cretaceous	Arkadelphia
	Nacatoch Sand
	Saratoga Chalk
	Marlbrook Marl (Restricted)
	Annona Chalk
	Ozan
	Brownstown
	Tokio
Comanche (Trinity Group)	Paluxy
	Upper Glen Rose
	Glen Rose Anhydrite
	Lower Glen Rose -- Rodessa & Pine Island Members
	Travis Peak

The Pettit oolitic lime occurs in the lower part of the Lower Glen Rose formation in the Pine Island Member. The same limestone is productive of oil and gas in the Sligo Field and of oil in the Lisbon Field. The thickness of the oil saturated porous lime ranges from 3 to 20 feet.

The possibilities of production of oil and gas below the upper part of the Travis Peak formation have not been determined. Several sand bodies of low porosity were penetrated in the Gulf Refining Company-Hatcher #1 well, located in section 11-T17N-R15W., near the top of the Cotton Valley formation. This latter well, as shown on the accompanying map is located well down on the southwestern flank of the structure.

- (1) Grim, M. W. "Shreveport Field, Caddo Parish, Louisiana." A. A. P. G. Bull. Vol. 22, No. 9.





SIMMONS BUILDING MATERIAL COMPANY

SHREVEPORT, LOUISIANA

RODESSA, LOUISIANA

LONE STAR

INCOR
CEMENTS

STARCOR

“Ask Anyone We Serve”

WE SERVE ALL PHASES OF THE OIL INDUSTRY..
OUR WELL LOG STRIPS; DRILLING REPORTS
SHOWING HOURLY PROGRESS; TOWNSHIP
PLATS; LEASES AND OTHER FORMS ORIGINATED
BY US ARE VERY POPULAR AND ACCEPTED AS
LEADERS IN THE OIL INDUSTRY



M. L. BATH COMPANY, LTD.
608-10-12 MARKET ST. • SHREVEPORT, LA.

Please Visit Our Store and Showroom While Here

YOU CAN HAVE ALL THE
CURVES
YOU WANT! *with the* **HOWCO**
"JEEP"
ELECTRICAL
LOGGING

**CURVE
E**

Natural Potential of the formations.

**CURVE
Z**

Electrical Impedance, using an exploring electrode 5" long, giving the very finest readings for correlation purposes.

CURVES

Z⁵, Z⁶, Z⁷, or Z⁸, etc. Similar to the Z curve but with exploring electrodes spread apart in feet equal to the numeral following the letter Z. For instance, curve Z⁵ has an electrode spacing of 5 feet, Z⁶ - 6 feet, etc.

**CURVE
T**

Temperature.

OTHER USEFUL CURVES UNDER DEVELOPMENT

HALLIBURTON OIL WELL CEMENTING COMPANY

GARLAND CITY POOL
TOWNSHIPS 15 AND 16 SOUTH, RANGE 26 WEST,
MILLER COUNTY, ARKANSAS
BY L. R. MCFARLAND

The Garland City Pool, located in Twps. 15 and 16S., R. 26W., Miller County, Arkansas, was named after the town of Garland City, located about four miles to the northeast of the pool. The discovery well, Texarkana Oil Corporation (formerly Fitzwater et al) E. L. Beck No. 1, in the SW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Sec. 33, Twp. 15S., R. 26W., was completed on October 10, 1932, with an initial production of 25 barrels of oil per day on the pump.

Development of the field was slow, and, during the next three years, 28 producing wells and 15 dry holes were drilled. The productive area covers approximately 260 acres and is confined to the S $\frac{1}{2}$ of Sec. 33, S $\frac{1}{2}$ of Sec. 34-15S-26W; N $\frac{1}{2}$ of Sec. 3, and N $\frac{1}{2}$ of Sec. 4-16S-26W. The initial production of the wells ranged from 25 to 300 barrels per day.

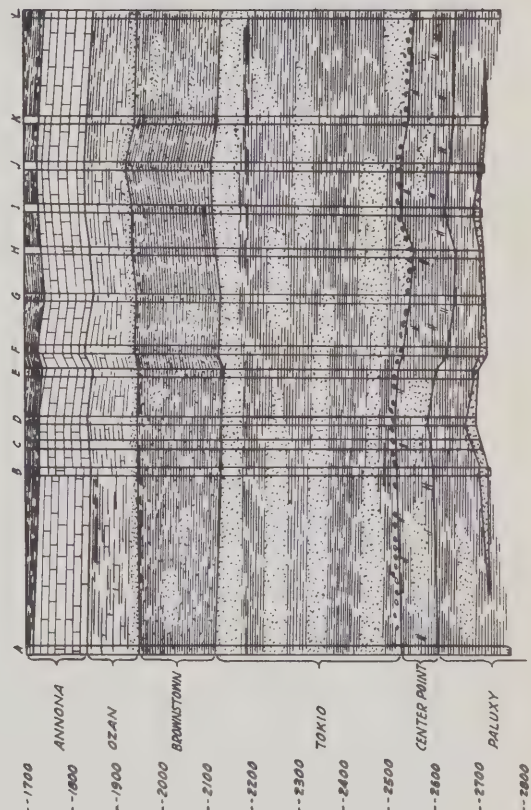
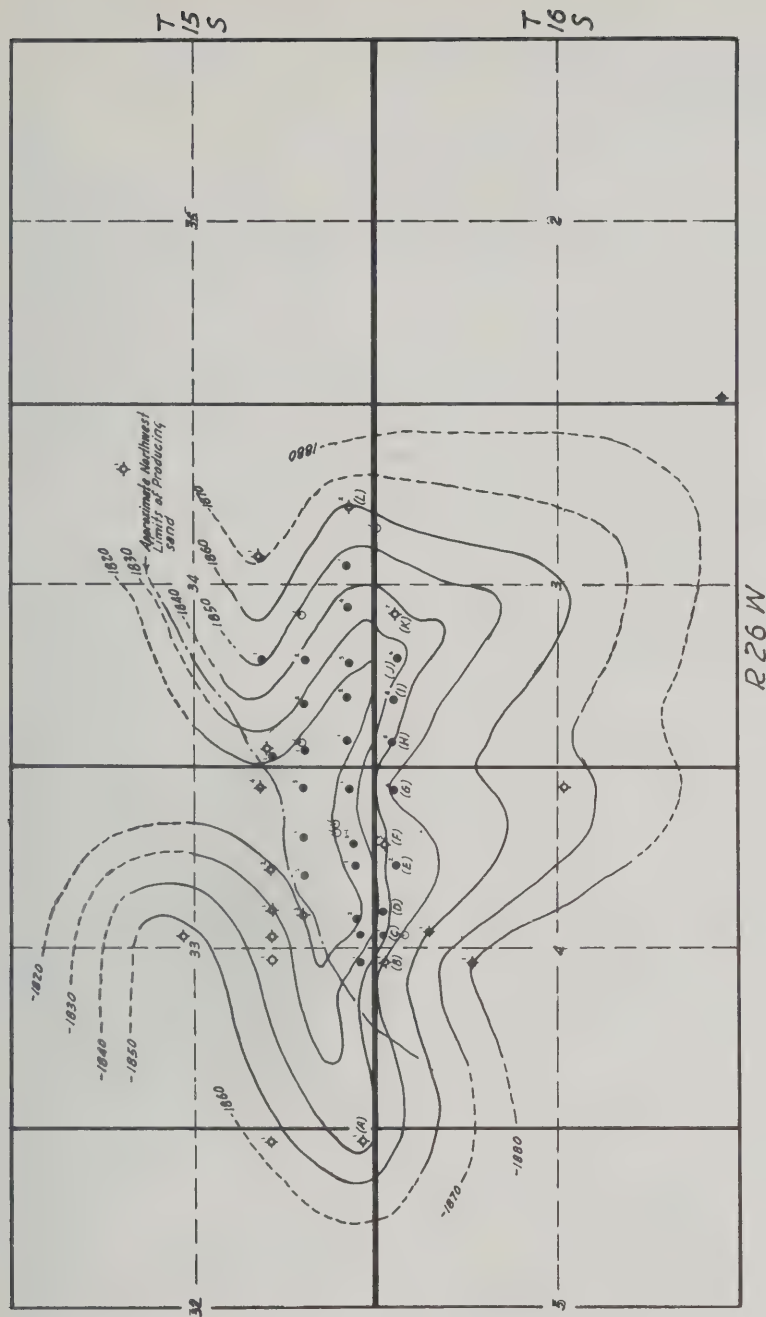
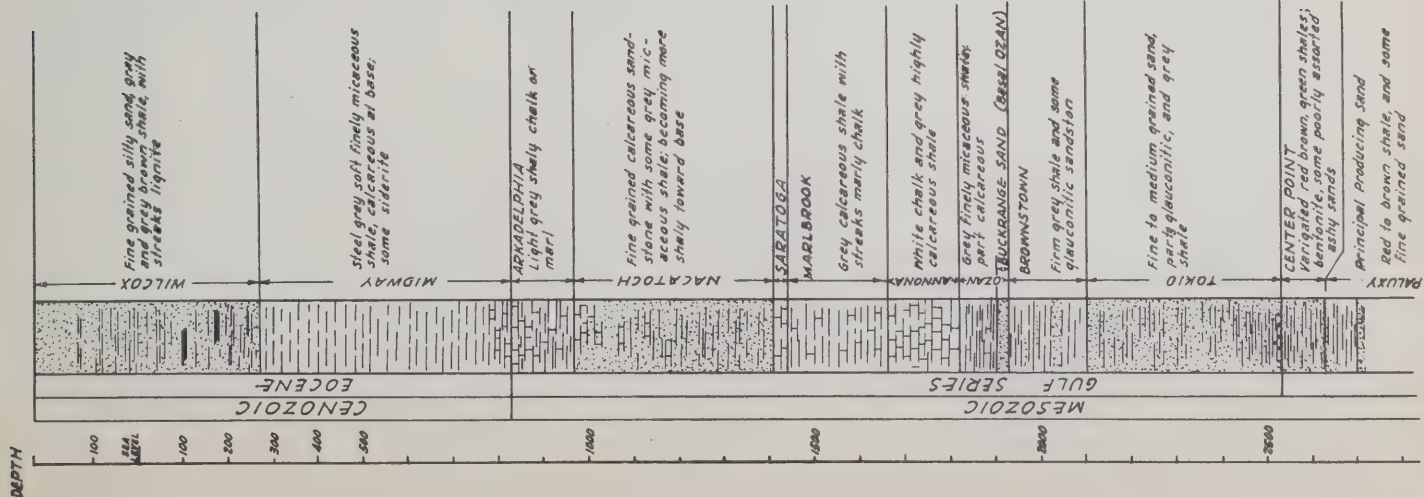
The principal producing horizon in the Garland City Pool is a sand in the upper part of the Paluxy formation, about 65 to 75 feet below the top of the Lower Cretaceous. The average depth of this sand is around 2930 feet. In general, the productive limits of the sand are controlled to the south and west by structure, and to the north and west by lenticularity of the sand. The structure of the area, as delineated on the base of the Annona chalk, is an elongated east-west "nose." A few wells in the southeastern part of the field obtained production from a lenticular sand in the Centerpoint volcanics, approximately 130 feet above the principal producing sand.

To date, no wells within the productive limits of the pool have penetrated below the upper Paluxy formation. However, some deep tests have been drilled in the surrounding area; Jenkins Bros. - Smith No. 1, in the southeast corner of Section 32-15S-26W, one-half mile west of the pool, was dry and abandoned in the Lower Glen Rose formation at a total depth of 4423 feet; E. H. Moore - Dale No. 2, in Section 24-15S-26W, was dry and abandoned in the Smackover lime at a total depth of 7306 feet; and Lenz et al - Dale No. 6, in Section 24-15S-26W, was completed as a small oil producer in the Lower Glen Rose formation from a depth of 4210 to 4216 feet.

As of January 1, 1939, the cumulative production for the field was 1,742,000 barrels, which, on a basis of 260 productive acres, indicates a recovery of 6700 barrels per acre. As of April 1, 1939, the average daily production was 300 barrels from 19 wells. The gravity of the oil ranges from 27° to 33° Baumé.

The following table shows the production by years to January 1, 1939:

<u>Year</u>	<u>Production</u>	<u>Cumulative Production</u>
1933	105,210	105,210
1934	444,660	549,870
1935	555,410	1,105,280
1936	325,045	1,430,325
1937	175,690	1,606,015
1938	135,995	1,742,010



TENTATIVE CORRELATION CHARTS
OF THE GULF COAST
MESOZOIC AND CENOZOIC SYSTEMS
COMPILED BY
B. W. BLANPIED AND ROY T. HAZZARD

Two correlation charts are submitted showing tentative correlations of the formations of the Mesozoic and Cenozoic systems in the Gulf Coastal Plain. An attempt is made to show the north Mexican and certain European correlatives of formations of the Gulf Coastal Plain.

The Mesozoic nomenclature used for formations of the Trinity and pre-Trinity (?) groups is essentially the same as that approved by the Shreveport Geological Society in 1938, for the Ark-La-Tex area. The age assignment of the Cotton Valley, Buckner, Smackover Lime and Eagle Mills formations is still in doubt. A new Gulf Cretaceous name is submitted by Hazzard to replace the volcanic Woodbine sand of southwest Arkansas, namely--the Centerpoint Volcanics. The formation is correlated with the Eagleford of Texas and Louisiana and with the Tuscaloosa of Mississippi and Alabama. The Mexican and European correlations were taken from papers by Imlay, Kellum, Kane and Jones published in the Geological Society of America Bulletins and from Adkins' discussion of the Mesozoic in University of Texas Bulletin No. 3232.

The Cenozoic correlation chart was compiled from papers published by various authors. The Mexican correlation is from Muir, Schuchert and Monsour. Papers by Vaughan, Cooke and others were referred to for the European correlation with modifications by the compilers.

New names and correlations are suggested in the Eocene Wilcox of Alabama. The Nanafalia formation is divided into two lithologic members, the Salt Mountain limestone as correlative of the "Ostrea thirsae beds," and the Grampian Hills member as correlative of the "Pseudo-buhrstone" beds of Smith. In the Oligocene of Mississippi and Alabama, the Glendon limestone is reduced from formational rank to a member, or facies, of the Marianna limestone. This agrees with Cooke (1918). Later however he raised the member to formational rank (1923) at which time he correlated the chert beds of southeastern Alabama, Georgia and Florida with the Glendon. These chert beds, now designated as Flint River formation by Cooke, are correlated with the Chickasawhay formation of Wayne County, Mississippi, and with the Antigua limestone of the Island of Antigua. Vaughan has correlated the Antigua limestone with the Flint River formation and with the Rupelian of Europe on the similarity of corals. Davies points out that the Rupelian is thought by many paleontologists to be of Miocene age.

Acknowledgments are given on each correlation chart to the various authors whose data were used or referred to in making these compilations. Many of these references were given orally.

TENTATIVE CORRELATION CHART GULF COAST MESOZOIC SYSTEMS

EUROPE	NORTHERN MEXICO	SOUTHWESTERN TEXAS	NORTHEASTERN TEXAS	SOUTHERN ARKANSAS	NORTHERN LOUISIANA	MISSISSIPPI	ALABAMA	
MAESTRICHTIAN	NAVARRO GROUP	NAVARRO GROUP	KEMP FM. NACATOKH SAND NEYLANDVILLE FM.	ARKADELPHIA CLAY NACATOKH FM. SARATOGA CHALK	ARKADELPHIA CLAY NACATOKH FM. SARATOGA CHALK	OWLE CREEK BLUFF TONGUE RIPLEY FM. HOUSTON MARL	PRAIRIE BLUFF TONGUE RIPLEY FM. SELMA CHALK	PROVIDENCE SAND RIPLEY FM.
CAMPANIAN	TAYLOR GROUP	TAYLOR GROUP	UPPER TAYLOR PECAN GAP TONGUE WOLF CITY SAND TAYLOR CLAYS	MARLBROOK MARL (RESTD.) ANNONA CHALK OZAN FM. BUCKRANGE SAND	MARLBROOK MARL (RESTD.) ANNONA CHALK OZAN FM. BUCKRANGE SAND	SELMA CHALK TUPELO TONGUE COFFEE SAND ARCOLA IS. MOOREVILLE TONGUE	SELMA CHALK ARCOLA IS. BLUFF TOWN FM.	CUSSETA SAND
UPPER SANTONIAN	AUSTIN GROUP	AUSTIN GROUP	GOBER TONGUE BROWNSTOWN MARL (RESTRICTED) BLOSSOM SAND BONHAM CLAYS ECTOR TONGUE	BROWNSTOWN MARL (RESTRICTED) TOKIO FM.	BROWNSTOWN MARL (RESTRICTED) TOKIO FM. ECTOR TONGUE	EUTAW FM. SANDS & CLAYS	EUTAW FM. SANDS & CLAYS	TOMBIGBEE SAND
LOWER SANTONIAN CONIACIAN								
TURONIAN	INDIDURA FORMATION	EAGLEFORD GROUP	EAGLEFORD TARRANT - LEWISVILLE DEXTER SAND WOODBINE SAND	# CENTER POINT VOLCANICS	# EAGLEFORD	TUSCALOOSA FM.	TUSCALOOSA FM.	TUSCALOOSA FM.
UPPER ALBIAN	CUESTA DELCURA LIMESTONE	WOODBINE GROUP	BUDA FM. GRAYSON FM. MAIN STREET FM. PAW PAW FM. WENO FM. DENTON FM. FORT WORTH FM. DUCK CREEK FM.	WASHITA GROUP	WASHITA GROUP	NOT PRESENT IN NORTHERN LOUISIANA MAY BE FOUND SOUTH OF SABINE UPLIFT		
MIDDLE ALBIAN		FREDERICKSBURG GROUP	KIAMICHI FM. EDWARDS IS. COMANCHE PEAK WALNUT MBR.	KIAMICHI FM. GATES-VILLE FM. GOODLAND IS. WALNUT MBR.	UNDIFFERENTIATED IN WELLS	UNDIFFERENTIATED IN WELLS		
LOWER ALBIAN	AURORA LIMESTONE	GLEN ROSE FORMATION	UPPER GLEN ROSE FM. ANHYDRITE STR. GLEN ROSE ANHYDRITE ANHYDRITE STR. RODESSA MEMBER JAMES-YOUNG PINE ISLAND MBR. TRAVIS PEAK FM.	UPPER GLEN ROSE FM. ANHYDRITE STR. GLEN ROSE ANHYDRITE ANHYDRITE STR. RODESSA MEMBER JAMES-YOUNG PINE ISLAND MBR. TRAVIS PEAK FM.	UNDIFFERENTIATED IN WELLS	UNDIFFERENTIATED IN WELLS	TRINITY GROUP	NOT RECOGNIZED
APTIAN	LA PEÑA FM. PARRITAS FM. LAS VEGAS FM.	CUCHILLO FORMATION TYPE TRAVIS PEAK LAS VEGAS FM.	UPPER GLEN ROSE FM. ANHYDRITE STR. GLEN ROSE ANHYDRITE ANHYDRITE STR. RODESSA MEMBER JAMES-YOUNG PINE ISLAND MBR. TRAVIS PEAK FM.	UPPER GLEN ROSE FM. ANHYDRITE STR. GLEN ROSE ANHYDRITE ANHYDRITE STR. RODESSA MEMBER JAMES-YOUNG PINE ISLAND MBR. TRAVIS PEAK FM.	UNDIFFERENTIATED IN WELLS	UNDIFFERENTIATED IN WELLS	TRINITY GROUP	NOT RECOGNIZED
NEOCOMIAN	HIATUS							

① - SIERRA DE PARRAS WESTERN PART, AFTER R.W. ILMAY
 # - FORMATIONS NOT EXPOSED ON SURFACE IN THIS AREA
 * - NEW NAME AND CORRELATION BY ROY T. HAZZARD
 p - CONSIDERED TO BE UPPER TAYLOR BY SOME
 4 - CONSIDERED TO BE LOWER TAYLOR BY SOME

ROY T. HAZZARD
 MERLE C. ISRAELSKI
 C.H. DANE
 J.D. WOODY

W.H. MONROE
 W.L. MCKENNA
 A.H. PURDUE
 A.M. LLOYD

THEODORE S. JONES
 ALVA C. ELLISOR
 W.C. THOMPSON
 W.C. SPOONER
 C.L. MOODY

COMPILED BY B.W. BLANPIED WITH ACKNOWLEDGMENTS TO

IN N.E. PART OF STATE

IN NORTH PART OF STATE

Compliments of

MID-CONTINENT SUPPLY COMPANY

SAM BACKUS
District Manager

Shreveport, La.

TENTATIVE CORRELATION CHART GULF COAST CENOZOIC SYSTEMS

COMPILED BY B. W. BLANPIED AND ROY T. HAZZARD

CENOZOIC T E R T I A R Y	EUROPE	MEXICO	TEXAS	ARKANSAS	LOUISIANA	MISSISSIPPI	ALABAMA
MIOCENE	QUATERNARY		ALLUVIUM	ALLUVIUM	ALLUVIUM	ALLUVIUM	ALLUVIUM
	PLISTOCENE		BEAUMONT	GRAVEL AND SAND TERRACES	BEAUMONT	PORT HUDSON	HIGH STREAM AND BEACH TERRACE
			WILLIS	TERRACE GRAVELS	CITRONELLE	CITRONELLE	CITRONELLE
			GOLIAD	NOT PRESENT	IN SUBSURFACE	NOT PRESENT	NOT PRESENT
MIOCENE	HELVETIAN BURDIGALIAN	TÚXPAN	FLEMING	NOT PRESENT	PASCAGOULA	PASCAGOULA	PASCAGOULA
			OAKVILLE		HATTIESBURG	HATTIESBURG	HATTIESBURG
		MESÓN	ONALASKA	NOT PRESENT	SANDS & CLAYS	SANDS & CLAYS	SANDS & CLAYS
			HETEROSTEGINA ZONE		"FRIO"	"FRIO"	"HETEROSTEGINA ZONE"
OLIGOCENE	RUPELIAN		OVERLAPPED ON SURFACE PRESENT IN SUB-SURFACE	NOT PRESENT	OVERLAPPED ON SURFACE PRESENT IN SUB-SURFACE	CHICKASAW-HAY	CHICKASAW-HAY
			UPPER		BYRAM MARL	BYRAM MARL	BYRAM MARL
		ALAZÁN	OVERLAPPED ON SURFACE PRESENT IN SUB-SURFACE	NOT PRESENT	MINT SPRINGS	MINT SPRINGS	GLENDON IS MEMBER MARIANNA IS CHIMNEY ROCK ¹ FACIES
	LATTORFIAN		WHITSETT	JACKSON	WHITSETT-DANVILLE	WHITSETT-DANVILLE	JACKSON - OCALA
Eocene	PRIABONIAN	CHAPAPOTE	MC ELROY		MC ELROY YAZOO	MC ELROY YAZOO	MOODY'S MARL
	BARTONIAN		CADDELL		CADDELL CLAY	CADDELL CLAY	COCKFIELD
		TANTOYUCA	COCKFIELD	COCKFIELD	COCKFIELD	COCKFIELD	COCKFIELD
	AUVERSIA	GUAYABAL	CROCKETT	COCKFIELD	COCKFIELD	COCKFIELD	COCKFIELD
Eocene	LUTETIAN	TEMPOAL	WECHES	WECHES	WECHES	WECHES	WECHES
			QUEEN CITY	QUEEN CITY	QUEEN CITY	QUEEN CITY	QUEEN CITY
			REKLAW	REKLAW	REKLAW	REKLAW	REKLAW
			ARP SD	ARP SD	ARP SD	ARP SD	ARP SD
Eocene	YPRESIAN SPARNACIAN	ARAGÓN	SABINE TOWN	UNDIFFERENTIATED	SABINE TOWN	SABINE TOWN	SABINE TOWN
			ROCKDALE		ROCKDALE	ROCKDALE	ROCKDALE
			SEGUIN		SEGUIN	SEGUIN	SEGUIN
			WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT
Eocene	THANETIAN	TANLAJÁS	KINCAID	KINCAID	KINCAID	KINCAID	KINCAID
			WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT
			WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT
			WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT	WILLS POINT

ACKNOWLEDGMENTS TO

① MRS. PLUMMER REMARKS "THAT THE MENDES TAMESI SHARP PALEONTOLOGICAL BREAK IS REPRESENTED BY THE NAVARRO - MIDWAY AND RIPLEY - MIDWAY BREAKS OF THE GULF COAST."

② MORLEY DAVIES STATES THAT THE OLIGOCENE AGE ASSIGNMENT OF THE RUPELIAN OF ITALY IS IN CONTROVERSY THAT IT IS CONSIDERED TO BE OF MIOCENE AGE BY SOME PALEONTOLOGISTS

* NOT EXPOSED ON SURFACE

③ DAVIES POINTS OUT THAT LATTORFIAN IS CONSIDERED TO BE UPPER EOCENE BY MANY EUROPEAN GEOLOGISTS - EVIDENCE POINTS TO ABSENCE OF TYPE VICKSBURG IN EUROPE

④ FIELD WORK HAS DEMONSTRATED THAT THE GRENADA AS SHOWN ON PLATE 2 W.S.P. 576 IS IN PART TALLAHATTA

⑤ NEW NAME AND CORRELATION MANUSCRIPT IN PREPARATION BY B.W. BLANPIED

⑥ CORRELATIONS BY BLANPIED AND HAZZARD - MANUSCRIPT IN PREPARATION

⑦ GARRETT HAS DEMONSTRATED THAT THE NONIONELLA BEDS OF UPPER COCKFIELD ARE JACKSON IN AGE

ACKNOWLEDGMENTS TO

C.L. MOODY
J.A. HANNA
F.B. PLUMMER
C.WYTHE COOKE
G.C. MATSON
W.L.F. NUTTALL
J.V. HOWE
JOHN DOERING
MERLE C. ISRAELSKY
T.WAYLAND VAUGHAN
ALVA C. ELLISOR
H.B. STENZEL
J.H. MC GUIRT
E.T. MONSOUR
J.B. GARRETT JR.
A.R. MORRINHIVEG
U.S. GRANT IV
L.G. HERTLEIN
J.T. MCGLOTHLIN
URBAN B. HUGHES
W.A. VER WIEBE
MRS. F.B. PLUMMER
CHARLES SCHUCHERT

DEEP DEVELOPMENT IN THE SHONGALOO POOL
TOWNSHIPS 22 AND 23 N., RANGES 9 AND 10 W.
WEBSTER PARISH
LOUISIANA
BY EVERETT EAVES

The Shongaloo pool is located in Twps. 22 and 23N., Ranges 9 and 10W., Webster Parish, Louisiana. Production was first developed in March, 1921, from the Buckrange sand, which is still producing a small amount of oil and gas. During the last year and a half three deep tests have been drilled in this pool by the Magnolia Petroleum Company. Two of these tests, Sexton Unit No. 1 and Branton Unit No. 1, were completed as gas-distillate wells, and the other, Roseberry Unit No. 1, was completed as a small oil well. All three are producing from sand zones 1200 to 1500 feet below the top of the Cotton Valley formation.

The Sexton Unit No. 1, in the S $\frac{1}{2}$ of Section 32-23N-9W; the first deep completion in the pool, was drilled to a total depth of 10,461 feet. Seven-inch casing was set at depth of 9464 feet, and perforated from 8990 feet to 9010 feet, opposite the upper part of the "Sexton" sand. The initial production on June 3, 1938, was 268 barrels of distillate, with 3,165,268 cubic feet of gas in 24 hours. Gravity of the liquid product is 60.8° Baumé.

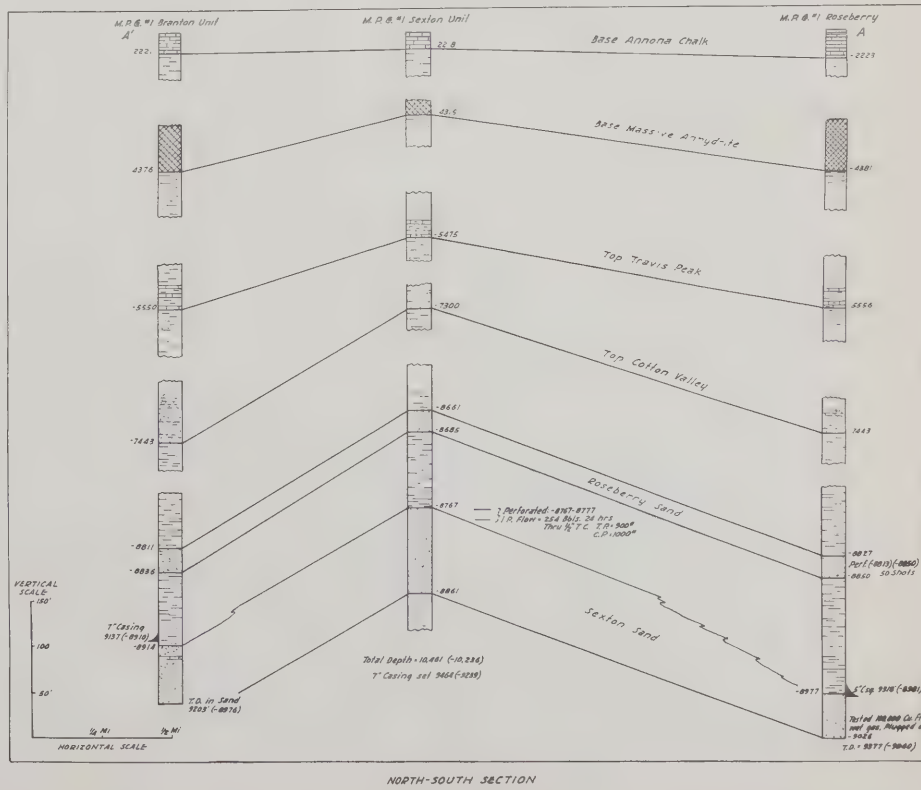
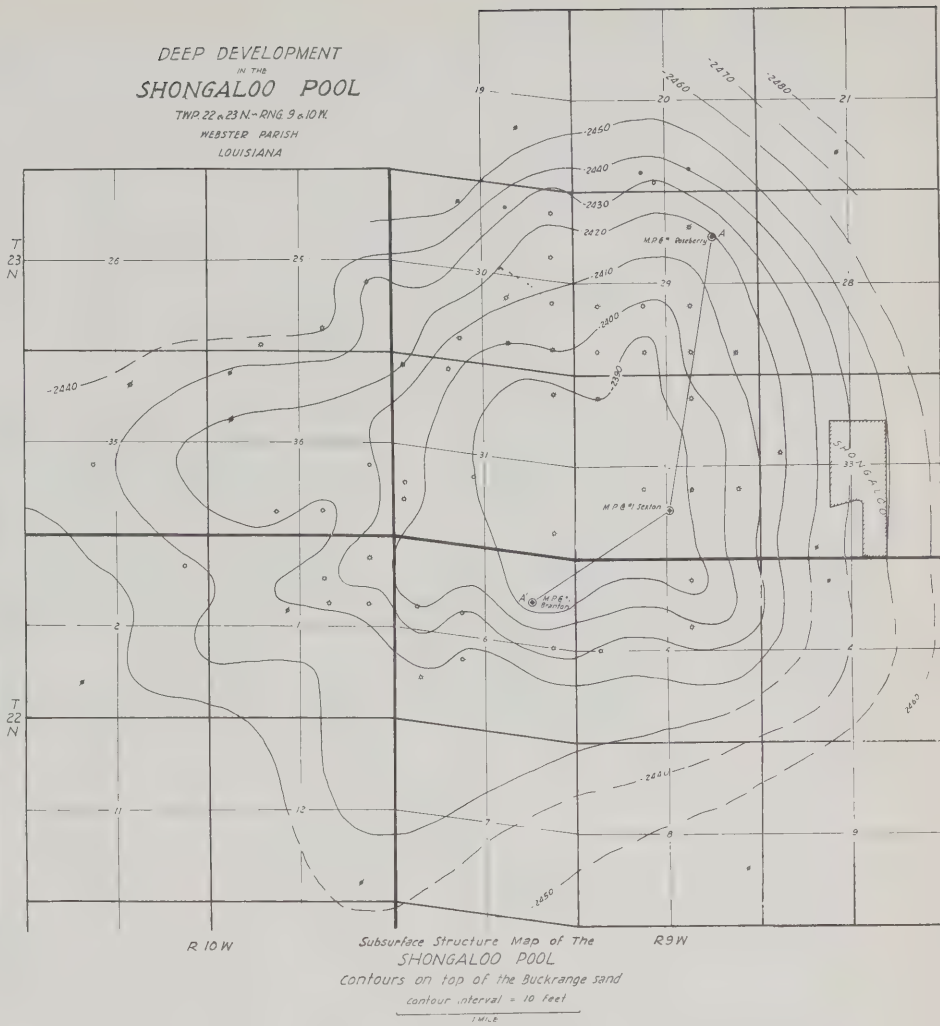
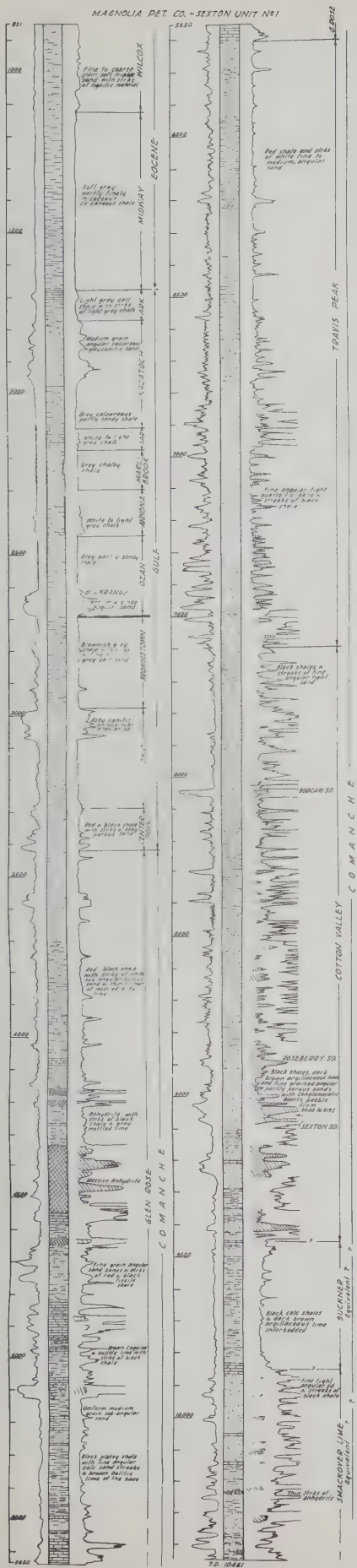
Branton Unit No. 1, center of NE $\frac{1}{4}$ of Section 6-22N-9W, was drilled to a total depth of 9203 feet and seven-inch casing was set above the "Sexton" sand at depth of 9137 feet. The initial production on February 23, 1939, was 92 barrels of distillate and 1,396,000 cubic feet of gas in 24 hours.

Roseberry Unit No. 1, center of the NE $\frac{1}{4}$ of Section 29-23N-9W, was drilled to a total depth of 9377 feet and 5 $\frac{1}{2}$ " casing was set at depth of 9318 feet near the top of the "Sexton" sand zone. On production tests this sand produced only a small amount of gas and the well was plugged back and perforated opposite the "Roseberry" sand from 9150 feet to 9187 feet. The initial production was 74 barrels of 49.8° Baumé gravity oil in 24 hours flowing by heads.

The "Roseberry" sand occurs 1360 feet below the top of the Cotton Valley formation. The average thickness is 25 feet and, in the Roseberry Unit No. 1 where best developed, it has a porosity of 10 to 12 percent, but the permeability is very low. In the other two wells located to the south, the sand becomes quite shaley and has very low porosity. The "Sexton" sand is 105 feet below the top of the "Roseberry" sand, and is rather fine grained, calcareous and slightly conglomeratic. The porosity ranges from 5 to 13 percent, but, as is the case with the "Roseberry" sand, the permeability is low.

Following is the production data on the deep wells in the Shongaloo Pool:

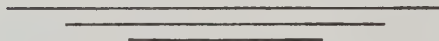
	<u>Present Average Daily Production</u>	<u>Cumulative Production to May 1, 1939</u>
Sexton Unit No. 1	87 Bbls.	54,146 Bbls.
Branton Unit No. 1	85 "	6,266 "
Roseberry Unit No. 1	Fishing (May 8, 1939)	1,795 "



Compliments of

THE SUPERIOR IRON WORKS & SUPPLY CO., Inc.

SHREVEPORT, LOUISIANA



STORES

ARKANSAS

Magnolia

TEXAS

Houston
Dallas

LOUISIANA

Rodessa
Shreveport
Cotton Valley

TWELVE YEARS'
SUCCESSFUL EXPERIENCE
IN THE
ARK-LA-TEX AREA



GIDDENS-LANE BUILDING - SHREVEPORT, LOUISIANA

The Centerpoint Volcanics of Southwest Arkansas
A Facies of the Eagleford of Northeast Texas

by

Roy T. Hazzard

Introduction

Attention was directed to the existence of volcanic ash in the Gulf Cretaceous of Louisiana by Bramlette (8) and Grider (10) during 1924. Bramlette states that "the Bingen (29) in Arkansas is known to contain volcanic tuffs somewhat similar to those described." Miser and Ross (17) described in detail the lithology and extent of the volcanic deposits of the Bingen Formation of southwest Arkansas and southeast Oklahoma, giving detailed discussions concerning the chief rock types, manner of deposition and probable sources.

Earlier, in 1918, Miser and Purdue (16) had noted igneous rock pebbles in the Bingen gravels of the Caddo Gap and De Queen Quadrangles, Arkansas, and described greenish cross-bedded arkosic sands without specifically stating that these arkosic sands might be tuffaceous in character.

Additional and comprehensive descriptions of the character and areal distribution of these very interesting rocks followed in publications by Ross, Miser, Stephenson and Dane (17, 20, 11). The volcanic rocks of southwest Arkansas and similar rocks of the same age throughout northeast Texas and southeast Oklahoma were considered to be Woodbine in age by the above listed authors.

It is the writer's intent to demonstrate that the volcanic "Woodbine" of southwest Arkansas and its age equivalents in northeast Texas and southeast Oklahoma are in reality, Eagleford in age; and in so doing, to show that sedimentation during Eagleford time was widespread in South Arkansas, North Louisiana and in Mississippi and Alabama.

The writer's contention that the "Woodbine" volcanics of southwestern Arkansas and adjacent states, are Eagleford in age, necessarily must withstand considerable adverse geological criticism. Further, the correlation carries with it certain implications which many geologists and paleontologists interested in the Eagleford and Woodbine, may be loath to accept.

Acknowledgments

The writer is indebted to officials of the Gulf Refining Company for permission to publish this report. He wishes to acknowledge the help and cooperation of B. W. Blanpied, J. T. McGlothlin, J. D. Moody and V. N. Fisher, who made possible the detailed plane table work carried on in Red River, Lamar and Grayson Counties, Texas. With their aid, over a period of several months, the area was surveyed, detailed sections were measured, and samples and fossils were collected. Additionally, their discussions helped to clarify the writer's viewpoints on the correlation problems.

W. C. Spooner, C. L. Moody, S. A. Thompson and C. I. Alexander, during various discussions, have contributed pertinent ideas, both favorable and unfavorable to the writer's viewpoints.

The writer is also much indebted to Dr. L. W. Stephenson of the United States Geological Survey for his unfailing courtesy in making examinations of fossiliferous materials and detailed reports; and to Dr. Gayle Scott of Texas

Christian University of Fort Worth, Texas, to whom the writer has sent fossils at different times and with whom he has corresponded over a period of years on the Eagleford-Woodbine problems.

SUBSURFACE STUDIES OF SOUTH ARKANSAS
AND NORTHWEST LOUISIANA

An intensive study of well cuttings, cores, and electrical logs, of wells drilled in South Arkansas and North Louisiana, has been carried on during the past several years, hand in hand with the drilling developments of the Ark-La-Tex area during the same period.

Many geologists recognize, in the basal Gulf Cretaceous of the Ark-La-Tex area, the existence and widespread areal distribution of an apparently non-fossiliferous though lithologically distinct rock sequence. This sequence is characterized by tuffaceous, chloritic, conglomeratic sands interbedded with red and gray shales and gray, lignitic, micaceous shales. Stratigraphically, it underlies the Tokio Formation (11) and, depending upon the geographical position of the particular well from which samples may have come, it may rest on formations ranging in age from Washita to "Travis Peak." This rock sequence is the volcanic "Woodbine Formation" of Ross, Miser, Stephenson and Dane (20, 11).

As has been shown by wells drilled eastward from Cass, Marion and Harrison Counties, Texas, the volcanic "Woodbine" of the subsurface transgresses north-eastward and eastward from rocks of Washita age, across the Fredericksburg, Paluxy, Upper Glen Rose, Glen Rose Anhydrite, Lower Glen Rose, coming to rest on the "Travis Peak" and probably in some cases on the Cotton Valley Formation.

Geologists of the Ark-La-Tex area place the Gulf-Comanche Cretaceous boundary at the base of the volcanic "Woodbine" and interpret its transgressive relationship as marking the widespread encroachment of the early Gulf Cretaceous seas upon and across the bevelled erosional surface developed on the older Comanche rocks.

By a study of cutting and core records and electrical logs, Lloyd and Hazzard have been able to carry the volcanic "Woodbine" of the outcrop down-dip into Bossier and Webster Parishes, Louisiana (see regional cross sections by Lloyd and Hazzard in Fourteenth Annual Field Trip Guide Book Shreveport Geological Society). The characteristic red shales of the volcanic "Woodbine" begin to disappear in these Parishes, interfingering with dark shales. The tuffaceous sands and bentonitic clays, however, continue much further southward. The basal portion of the Tokio, overlying the volcanic "Woodbine," progressively becomes more calcareous southward. In the area embracing the southerly portions of Bossier and Webster Parishes, there begins the development of a chalk wedge at the base of the Tokio, which further to the south is widespread in Bienville, De Soto, Red River, Natchitoches and Sabine Parishes. This chalk wedge is correlated with the Ector Tongue of the Austin Chalk. It is characterized by a microfauna of Austin age (paleontological reports, E. B. Hutson and C. I. Alexander). Cores of this chalk contain specimens of Gryphea cf aucella.

The presence of Eagleford in the Gulf Cretaceous of Northwest Louisiana was first recognized by Dr. L. W. Stephenson (15; page 115) from fossils which came from wells drilled in the De Soto-Red River Field.

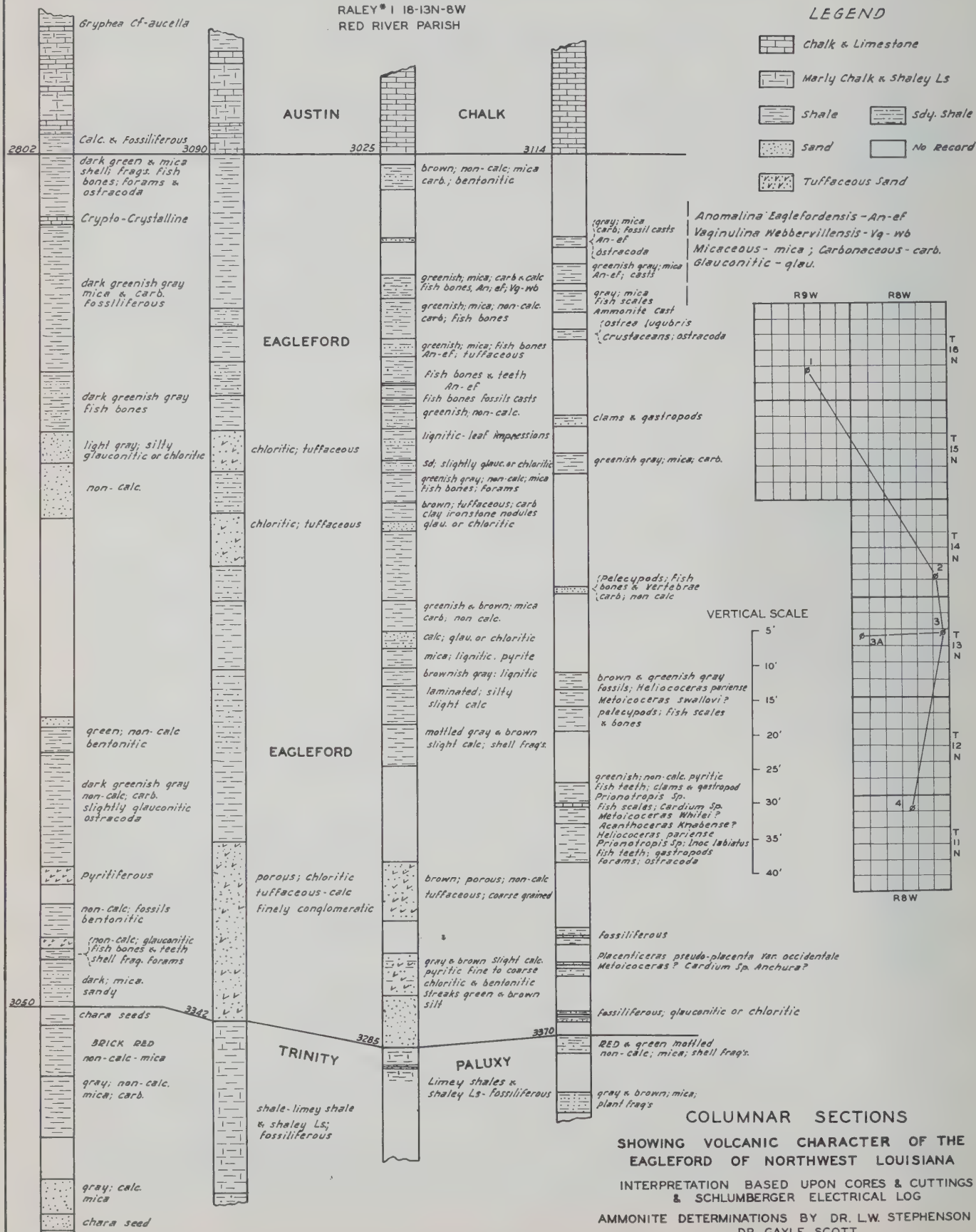
There is sufficient information, from cores and cuttings from a number of wells located in Bienville, Red River and Natchitoches Parishes, for the con-

S.P.BORDEN
THOMAS NO.1
27-16N-9W
BIENVILLE PARISH

GULF REF. CO.
GOODPINE NO.1
25-14N-8W
BIENVILLE PARISH

GULF REF. CO.
BODCAW LBR CO.NO.1
13-13N-8W
NATCHITOCHE PARISH
& A.F.SALES
RALEY*1 18-13N-8W
RED RIVER PARISH

AMERADA PET. CO.
WAVER NO.1
3-11N-8W
NATCHITOCHE PARISH



struction of fairly detailed lithologic logs. PLATE I shows these detailed logs, as well as the locations of the 5 wells from which information was available.

Reference to PLATE I will show that the interval from the base of the Austin Chalk to the top of the Trinity (Paluxy) is fairly constant in thickness for the wells shown. This particular interval is the stratigraphic equivalent of the interval measured from the base of the Tokio to the Gulf/Comanche Cretaceous unconformity, in wells located further to the north in Bossier and Webster Parishes, Louisiana. Since it has been demonstrated that this latter interval is equivalent in age to the volcanic "Woodbine" of the outcrop, it seems most reasonable to correlate the known down-dip Eagleford, represented by dark fossiliferous shales and interbedded tuffaceous sands and bentonitic clays, with its stratigraphic equivalent, the volcanic "Woodbine" of Southwestern Arkansas.

There is no question as to the Eagleford age of the sediments between depths of 3114 and 3370 feet in the Amerada-Wafer No. 1 well located in section 3-11N-8W., Natchitoches Parish, Louisiana. Dr. L. W. Stephenson and Dr. Gayle Scott examined the cores from this well; summarized excerpts from their reports are as follows:

Core Depths	Stephenson	Scott
3048-3114	Gray Limestones--Austin ?	Austin Chalk
3146-3152	Eagleford	
3165-3168	Eagleford	with <u>Ostrea lugubris</u>
3270-3275	Eagleford	with <u>Helicoceras parienne</u> and <u>Metoicoceras swallowi</u>
3297-3303	with <u>Prionotropis</u> sp	with <u>Inoceramus labiatus</u>
3305-07	with <u>Metoicoceras</u> ?	
3310-12	with <u>Prionotropis</u> ?	with <u>Metoicoceras whitei</u> ? <u>Acanthoceras knabense</u> ? <u>Helicoceras parienne</u> <u>Inoceramus labiatus</u> <u>Prionotropis</u> sp.
3318-20	with <u>Metoicoceras</u> sp. and <u>Prionotropis</u> ?	
3349-3350	with <u>Metoicoceras</u> ? and <u>Placenticeras</u> sp.	with <u>Placenticeras pseudo-</u> <u>placenta</u> var. <u>occidentale</u> ?

In the Holly Oil Field, Twp. 13N-R.13W., De Soto Parish, a number of wells have been cored from the Austin Chalk, through the Eagleford, into the Fredericksburg limestone. Dark fossiliferous shales interbedded with greenish tuffaceous, chloritic sands and greenish bentonitic shales make up the Eagleford section, here approximately 80 feet thick. Ammonites (Prionocyclus ?), pelecypods, and gastropods, were present in the dark shales associated with Anomalina eaglefordensis; fish bones and scales were common. Oil was encountered in the tuffaceous sands.

MEDILL-WOODLAND AREA
RED RIVER & LAMAR COUNTIES, TEXAS

In order to test the validity of the volcanic "Woodbine"-Eagleford correlation, indicated by subsurface work in Southwestern Arkansas and Northwestern Louisiana, a detailed plane table survey was made of an area in Northeast Texas, embracing adjacent portions of Red River and Lamar Counties. The volcanic outcrops at Silver City, Rock Ferry, Pine Bluff, Womack's Gin, Golden Bluff, and Arthur's Bluff (20) were accurately tied together and elevations determined. Additional outcrops of volcanic rocks were located.

Two detailed plane table sections were measured, the Medill-Womack's Gin Section (A) and the Woodland-Pine Bluff Section (B). These detailed sections are shown on PLATE 2.

Prior to the discussion of these detailed sections, some general features of the area will be touched upon.

Between Hinkley, Lamar County (Ry. station north of Paris) and Woodland, Red River County, the average regional strike on the base of the Bonham Clay is N 83° E., with regional dip at rate of 50 ft/mile in a direction S 7° E.

On the Medill-Womack's Gin Section, in the formations below the basal Austin conglomerate, the average strike is S 83° E., with average dip at rate of 53 ft/mile in a direction S 7° W.

In the vicinity of Woodland, the regional strike of both the Bonham Clay and the underlying formations swings to the northeast; an average strike of N 41° E. exists within the formations below the basal Austin conglomerate; with rate of dip between 53 and 56 ft/mile in a direction S 49° E.

The rocks exposed along the traverse lines of the Medill-Womack's Gin Section (A) and the Woodland-Pine Bluff Section (B) are similar in lithologic character; the latter section is shorter by 66 feet, measured from the base of the "Cannon Ball" Zone to the base of the Austin conglomerate.

AUSTIN

In the Medill-Woodland area the basal portion of the Bonham Clay is calcareous with a thin streak of sandy fossiliferous lime immediately at the base and thin chalky streaks interbedded in the calcareous clays above. Specimens of Gryphea cf. aucella are common on the outcrops of the Bonham Clay. A key horizon useful for stratigraphic purposes is a conglomerate, the base of which occurs approximately 25 feet below the base of the Bonham Clay. Intervening between the conglomerate and the base of the Bonham Clay are ferruginous sands, clayey ferruginous sands and tuffaceous sands which latter are fossiliferous. This particular sandstone zone, including the conglomerate, is correlated with Taff's

"fish bed conglomerate" (24, page 7).

The conglomerate varies in thickness from a few inches to a maximum of 4 feet. In several localities the ferruginous clayey matrix of the conglomerate appears to be volcanic in character. Pebbles as large as 2 inches in maximum dimension have been found; as a rule however, pebbles are less than 3/4 inch in maximum dimension; most are smooth and rounded. A pebble count has not been completed but a greater number of the 100 pebbles collected at random from a number of exposures are quartose rocks.

From all the evidence seen in the field, the base of the conglomerate marks an unconformity. The writer correlates this unconformity with the unconformity at the base of the Tokio in southwestern Arkansas (11, 24, 26, 4).

It already has been indicated that there exists in the Medill-Woodland area a difference of approximately 14° , between the regional strike of the base of the Bonham Clay and the strike of the beds underlying the Austin conglomerate. Detailed elevation work also indicates a slight difference in rate of regional southward dip. This difference in strike and dip supports the field evidences of unconformity at the base of the Austin conglomerate.

EAGLEFORD

On the Medill-Womack's Gin Section (A) (See PLATE 2) there is indicated the position of a fossiliferous limestone, one foot thick, which is 95 feet stratigraphically below the base of the Austin conglomerate. It occurs in an exposure of bluish gray, gypsiferous, septaria bearing clays. This fossiliferous limestone contains ammonites, gastropods and pelecypods. Metoicoceras swallowi was determined by Dr. Gayle Scott. On the basis of this ammonite determination, the 116 foot section from the base of the Austin conglomerate to the top of the second volcanic zone (Kanawha Volcanic Zone) is considered to be Eagleford in age.

For descriptive purposes, names have been applied to the three principal volcanic zones found below the base of the Austin conglomerate in the Medill-Woodland area. These are listed below, downward from the top of the Eagleford section:

- (1) Medill Volcanic Zone
- (2) Kanawha Volcanic Zone
- (3) Pine Bluff Volcanic Zone

Medill Volcanic Zone

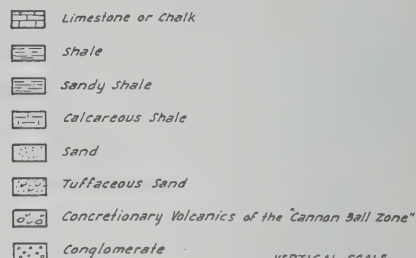
This zone of cross bedded tuffaceous sand varies from 11 to 20 feet in thickness. It is well exposed at the settlement of Medill from which locality the name was taken. The top of the Medill volcanic zone is approximately 15 feet below the base of the Austin conglomerate in the Medill-Woodland area. Fossils were not found in this zone.

Kanawha Volcanic Zone

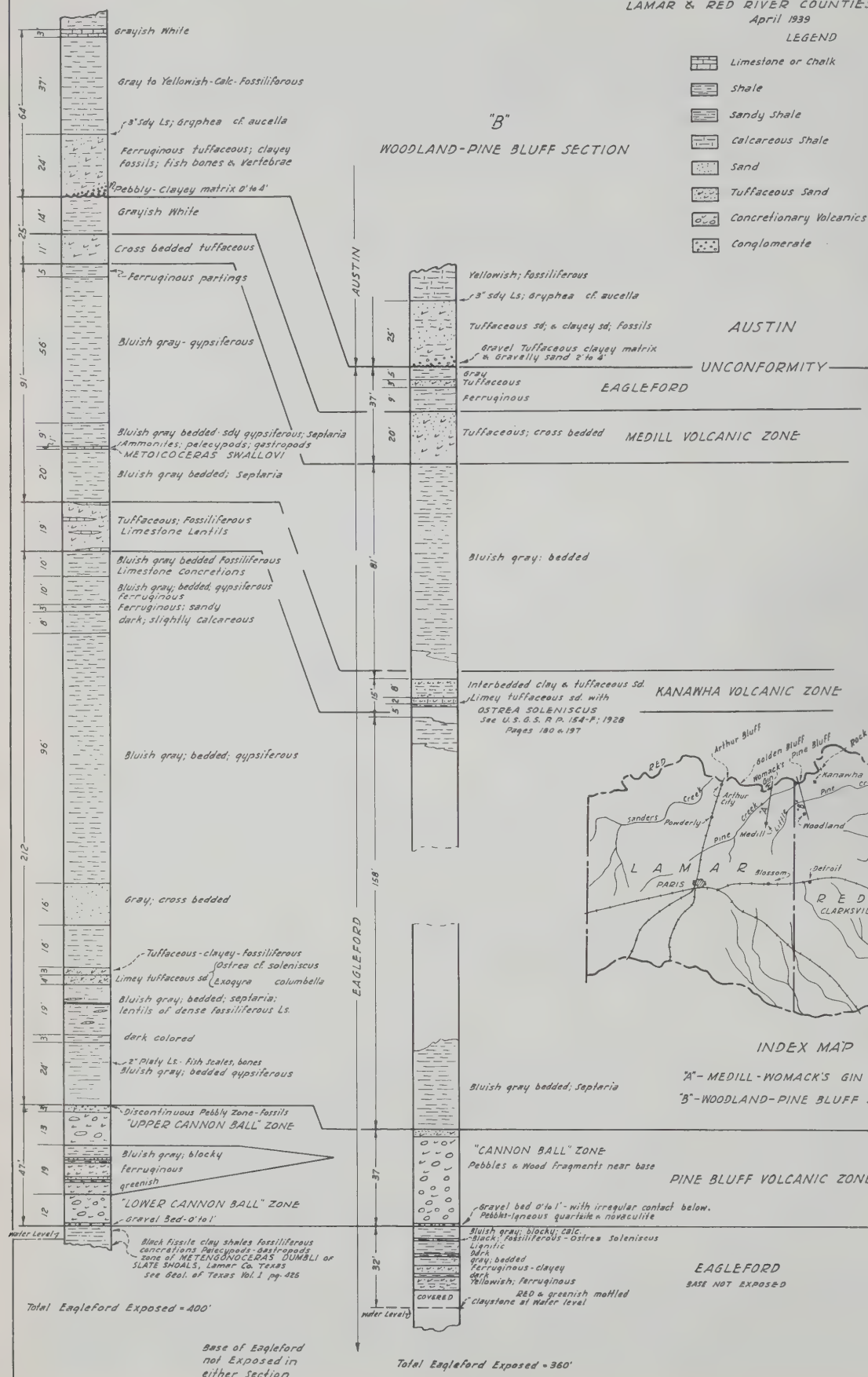
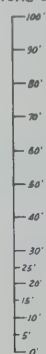
An interval of 80-90 feet of bluish gray, bedded clay-shales separates the base of the Medill Volcanic Zone from the top of the Kanawha Volcanic Zone. The fossiliferous limestone with Metoicoceras swallowi, found in the Medill-Womack's Gin Section, occurs 20 feet above the top of the Kanawha Volcanic Zone in the

COLUMNAR SECTIONS
SHOWING THE VOLCANIC CHARACTER OF THE
EAGLEFORD FORMATION
LAMAR & RED RIVER COUNTIES, TEXAS
April 1939

LEGEND



VERTICAL SCALE



same section.

The Kanawha Volcanic Zone is 15-20 feet thick. It is made up of ferruginous sands, clayey tuffaceous sands, tuffaceous sands with fossil casts, and is characterized by the development of fossiliferous, sandy limestone lenses and fossiliferous, calcareous sandstone lenses.

An interesting feature of the Kanawha Volcanic Zone is the presence of Ostrea soleniscus Meek (9), an elongate oyster considered to be a diagnostic fossil of the Upper Woodbine. The locality where these fossils may be seen to advantage is located on the Aigers farm approximately 2 miles northeast of the settlement of Kanawha, Red River County, at a point about a quarter of a mile south of the Aigers house, in the west bank of a small southward flowing stream (20; pages 180 and 197).

A description of the tuffaceous sand in which the oysters are imbedded, is given by Ross, Miser and Stephenson (20; page 197).

Pine Bluff Volcanic Zone

The most interesting volcanic zone of the three principal zones exposed in the Medill-Woodland area, is the Pine Bluff Zone, with most of its best exposures along the Red River. The upper part of this zone is exposed at Silver City Ferry, the basal part at Rock Ferry (Hankins Ferry); and the entire thickness at Pine Bluff, all localities being in Red River County.

The basal portion again is exposed at the Womack's Gin locality; exceptional exposures are seen at Golden Bluff and Arthur's Bluff; the top of the Pine Bluff Zone is exposed in a new quarry located approximately 2 miles west of Arthur City. All of these localities are in Lamar County.

At Hyatts Bluff, on Red River in Fannin County, the base of the Pine Bluff Volcanic Zone may be seen, here resting on dark, fossiliferous clay-shales. At the Choctaw Creek locality in Grayson County, the entire Pine Bluff Volcanic Section is exposed, although not in one continuous section.

The Pine Bluff Volcanic Zone as shown in its exposures from Red River County to Grayson County, varies from 37 to 54 feet in thickness with greater thickness to the west. In the Medill-Woodland area the shale interval from the base of the Kanawha zone to the top of the Pine Bluff Zone varies from 158 to 212 feet in thickness, also with the greater thickness to the west.

At the Pine Bluff locality, the Pine Bluff Volcanic Zone is represented by 37 feet of tuffaceous sand which is characterized by the development of large concretionary masses, spherical to flattened ellipsoidal in shape. This concretionary character seems to be so persistent in the Pine Bluff Zone that for purposes of field description this zone was designated as the "Cannon Ball" Zone.

Westward from Pine Bluff, a clay-shale-tuffaceous-sand wedge breaks the "Cannon Ball" Zone of Pine Bluff into two zones, an Upper and a Lower "Cannon Ball" Zone. These two zones were recognized at Golden Bluff, Arthur's Bluff, and at the Choctaw Creek locality in Grayson County. The lower "Cannon Ball" Zone is present at the Womack's Gin locality in Lamar County and at Hyatts Bluff in Fannin County. At Choctaw Creek, in the tuffaceous sands of the intervening wedge, Ostrea soleniscus and other fossils were found (see PLATE 3). The thickness of the intervening wedge increases westward.

At the base of the "Cannon Ball" Zone at Pine Bluff, at the Womack's Gin locality, and at Hyatts Bluff, the writer has seen a discontinuous pebbly zone up to one foot in thickness. At these three localities, this pebbly zone rests upon dark fossiliferous clays (see PLATE 2 and PLATE 3 for details). Igneous, quartzite, and novaculite pebbles and clay-balls were noted in the conglomerate at the Pine Bluff locality. The detailed lithologic character of the pebbles of the conglomerate at Womack's Gin and Hyatts Bluff were not noted, although quartzite pebbles were seen, associated with small concretionary masses.

At the top of the "Upper Cannon Ball Zone" (top of the Pine Bluff Volcanic Zone) of Golden Bluff, a few inches of conglomeratic tuffaceous sandstone with fossils, were noted. This conglomeratic sandstone appeared to be developed in pockets. Stephenson (20; page 198) lists the fossils found in this tuffaceous sand among which were Ostrea soleniscus Meek ?, Exogyra, Metoicoceras and Metengonoceras.

The writer has carefully examined the shale contact at the top of the Pine Bluff Volcanic Zone. This contact is well exposed at Pine Bluff and Golden Bluff, and exceptionally well exposed at the new quarry located approximately 2 miles west of Arthur City, Lamar County. So far as the writer can discern, there are no evidences pointing to the existence of an erosional unconformity or disconformity at the shale-volcanic rock contact.

At Pine Bluff, the thin and discontinuous conglomerate at the base of the Pine Bluff Volcanic Zone rests with undulating contact on the underlying beds; at one point it rests upon dark bluish blocky clay-shales; at another point some yards distant, it rests upon a sandstone. These evidences, however, are insufficient and inconclusive for basing an opinion that the Pine Bluff Volcanic Zone rests unconformably or disconformably on the underlying beds.

At Pine Bluff on Red River, Hill (12; page 302) noted the pebbles and clay-balls in the conglomeratic layer at the base of the Pine Bluff Volcanic Zone. Additionally he notes that "A fossil ammonite (Scaphites ?) and a crab were found at the base of this green sand, attached to a log of lignite" and that "The slope at the top of the bluff consists of clays with fossils Axinea and Scaphites."

At Pine Bluff, below the base of the Pine Bluff Volcanic Zone, there is exposed a 32 foot section of clays and interbedded yellowish ferruginous tuffaceous sands. Two thin seams of lignite occur about 5 and 10 feet, respectively, below the base of the conglomeratic layer. A dark, fossiliferous, clay with oyster fragments is present, at an interval of about four feet below the base of the conglomeratic layer. At water level, about six inches of red and greenish mottled claystone outcrops.

Dr. C. I. Alexander, who examined the clays from below the base of the "Cannon Ball" Zone for a micro-fauna, states that the lithology of the clays is suggestive of an Eagleford age.

At a locality approximately two miles west of Arthur City, Lamar County, there is exposed in a new road cut, a 22 foot section of dark, thin bedded, clay-shales, in which occur septaria and bedded lenses of gray, dense, fossiliferous, limestone. At the top of the clay section, a 7 foot exposure of limy fossiliferous, tuffaceous sand may be seen. The lower 4 feet of this tuffaceous sand is very fossiliferous. Mr. C. L. Moody who examined the fossils for the writer, recognized Ostrea cf. Soleniscus and Exogyra columbella, which determinations were later confirmed by Dr. L. W. Stephenson (telegraphic communication from

Dr. L. W. Stephenson).

The fossils of this tuffaceous sand are of particular interest to the writer, since Ostrea soleniscus is reported to be an upper Woodbine key fossil (9, 12, 1, 3, 20, 22, 23, 27, 31, 32, 33) and Exogyra columbella is reported both as an upper Woodbine and as a lower Eagleford fossil (1, 2, 3, 9, 19, 27).

The stratigraphic position of this fossiliferous, ferruginous sand is shown on the Medill-Womack's Gin Section, PLATE 2. The base of this sand is 46 feet above the top of the Pine Bluff Volcanic Zone.

Several years ago, W. C. Spooner and the writer spent several days in Red River and Lamar Counties, Texas, examining outcrops of the Pine Bluff Volcanic Zone along Red River. An attempt was made to reach Slate Shoals located in the Red River channel, the location of which was between a mile and two miles north-east of Womack's Gin. Local inhabitants informed Spooner and the writer that Slate Shoals was not in existence at that time, due to change in the course of the river bed, but that the same "slates" of Slate Shoals, could still be seen at extremely low water in the channel of Red River at a point approximately three miles northeast of Womack's Gin. This locality was visited; water level was sufficiently low to expose a mud flat, on the surface of which were exposed dark colored fissile clay-shales with interbedded, irregularly shaped, limy fossiliferous concretions. Quite an assemblage of gastropods and pelecypods were collected from these concretions. No ammonites were seen. The basal portion of the Pine Bluff Volcanic Zone was exposed in the south river bank, with the irregular gravelly lense resting on the dark clay shales. This locality was tied into the plane-table survey of the Medill-Woodland area recently made. The contact of the Pine Bluff Volcanics and the dark clay-shales was not exposed at this recent date, being about seven feet below water level.

From a consideration of the relative locations of Slate Shoals and the Womack's Gin locality, and the regional strike and dip, the exposures of the "slates" at the former Slate Shoals occur approximately 10-15 feet stratigraphically below the base of the Pine Bluff Volcanics.

Adkins (3, pages 424 and 425) in discussing Dr. W. L. Moreman's three subdivisions of the Eagleford, gives a definition of the basal unit abstracted from descriptions furnished by Moreman:

"Tarrant sandy clay and limestone.--Type locality: one mile east of Tarrant station (Tarrant County), at crossing of St. Louis, San Francisco and Texas railway over a tributary of Bear Creek. Typical thickness: 15 feet. Lithology: gray and brownish-gray sandy clay and intermittent thin brownish limestone strata and calcareous concretions. The basal stratum, unconformably overlying the Woodbine sand, is a phosphatic pebble conglomerate, 1 to 6 inches thick. The top is a parting of limonitic material less than 1 inch thick. Fossils: Acanthoceras tarrantense (Adkins), Metengonoceras dumbli (Cragin), Exogyra columbella Meek. Areal extent: The typical lithology and fossils persist from southern Denton County to southeastern Tarrant County. Northwards the unit is represented at Slate Shoals, Lamar County, by sandy clay containing Metengonoceras dumbli."

INDEX MAP

April 1939

Adkins' report of the finding of Metengonoceras dumbli (Cragin) (Epengonoceras dumbli (Cragin) of Spath) (1, 3, 6, 27), in the sandy clays of Slate Shoals, Lamar County, in sediments which the writer has demonstrated by detailed plane table work to be from 10-15 feet stratigraphically below the base of the Pine Bluff Volcanics, necessitates an Eagleford age assignment to the sedimentary beds exposed in the Medill-Woodland area below the Austin conglomerate. The presence of Metococeras swallovi and Exogyra columbella in the section above the Pine Bluff Volcanics and of Metengonoceras dumbli below the Pine Bluff Volcanic Zone makes it apparent that Ostrea soleniscus can no longer be considered a Woodbine key fossil.

Moreman (19; pages 91 and 92) points out an association of Acanthoceras aff. rotomagensis (de France) Engonoceras planum Hyatt, Exogyra columbella Meek and Ostrea soleniscus Meek, with foraminifera, ostracoda, fish remains and crustacean fragment, in the conglomeratic layer at the base of the Eagleford, at a locality east of Tarrant Station in Tarrant County, Texas. Adkins also (2; page 70) mentions an association of Ostrea soleniscus with Inoceramus labiatus, Gryphaea newberryi, Metococeras sp., and Baculites gracilis in lower Benton shales of Black Mesa, near Kayenta, Arizona.

The presence of Ostrea soleniscus in the Kanawha Volcanic Zone and its association with Exogyra columbella in an intermediate volcanic zone above the Pine Bluff Volcanic Zone are peculiar relationships unless Ostrea soleniscus is also an Eagleford fossil, as the association pointed out by Moreman (19) indicates it to be.

The section at Choctaw Creek, Grayson County, Texas, on the south flank of the Preston Anticline, is particularly interesting with reference to the stratigraphic position of Ostrea soleniscus.

PLATE 3 shows a measured section of the exposures at the Choctaw Creek locality. A normal thickness of approximately 11 feet of the Lower "Cannon Ball" Zone is well exposed, with its base in contact with bluish, blocky, clay-shales. The "Upper Cannon Ball" Zone is represented by a few feet of the typical concretionary tuff. Here the entire Pine Bluff Volcanic Zone is 54 feet thick. The interval between the concretionary "Cannon Ball" Zones, which consists of a 40 foot section of ferruginous tuffaceous sands and dark shales, contains a sandstone ledge packed with Ostrea soleniscus (determinations checked by C. L. Moody). It is the writer's opinion, based upon a study of several exposures of the Lewisville beds from Tarrant Station northward to Lewisville (in Tarrant and Denton Counties) that the Choctaw Creek section intervening between the "Cannon Ball" Zones, represents the Lewisville beds. The "Upper Cannon Ball" Zone at Choctaw Creek probably thins out westward within a few miles. The "Lower Cannon Ball" Zone has not been recognized by the writer further to the west on the south flank of the Preston Anticline, although a thin equivalent may be present.

GENERAL CONSIDERATIONS

The non-volcanic portion of the section exposed in the Medill-Woodland area below the Austin conglomerate is similar lithologically to Eagleford sections seen in Tarrant and Dallas Counties and northward of these counties. The exposures of gray, bedded, gypsiferous clay-shales, many with ferruginous partings, septaria and bedded limestone concretions, and zones of fossiliferous iron stone concretions, are features which immediately suggest rocks of Eagleford age to the observer who has seen typical Eagleford to the westward. There can be no

question in the field as to the upper limit of this rock sequence. On the contrary, it is difficult to delimit the lower boundary. On any field evidence yet seen by the writer, such a boundary, if placed, necessarily will reflect personal opinion. As pointed out in the foregoing and as shown on PLATES 2 & 3, it is the writer's opinion that the lower boundary of the rock sequence below the Austin conglomerate, here assigned to the Eagleford, is not exposed in the area covered by the detailed plane table surveys.

Ross, Miser and Stephenson consider the volcanic rocks of Lamar, Red River and Fannin Counties, Texas, and those exposed in the bordering counties of Oklahoma, to be Woodbine in age, and correlate these rocks with the volcanic rocks of southwest Arkansas. In this publication (20), no description is given of the upper boundary of the Woodbine. The reader must assume that the volcanic exposure with Ostrea soleniscus located 2 miles northeast of Kanawha, Red River County (20, pages 180 and 197) was correlated with the volcanic exposure at Pine Bluff, located several miles to the northwest of Kanawha. No specific mention is made of the existence of the several distinct volcanic zones below the Austin conglomerate, interstratified within the 350 to 400 foot clay-shale section exposed north of Medill and north of Woodland. The age of the volcanics, apparently irrespective of stratigraphic position in the clay section is based upon the presence of Ostrea soleniscus in various scattered outcrops.

Except the references made by Adkins (3) to Moreman's work on the zonation of the Eagleford of North Texas (19), the writer has found no references to this very important paper.

One of the best localities for seeing the evidence of an unconformity at the base of the Eagleford, is the one mentioned by Moreman, located east of Tarrant Station, in Tarrant County, on the right-of-way of the St. L. S. F. & T. Ry. Here, Moreman's zone of Acanthoceras aff. rotomagense, in a limy, sandy, conglomeratic zone above the Woodbine, contains Exogyra columbella and Ostrea soleniscus. The importance of this fossil association may be appreciated to better advantage after a study of the evidences of the unconformable contact at the base of the conglomeratic layer. The field relationships to be seen in the many stream cuts on either side of the railroad right-of-way are best interpreted as evidence of a unconformity between two sets of eastward dipping beds, the lower beds, the Woodbine formation, having a perceptibly greater eastward rate of dip than the overlying Eagleford. Another interpretation, of course, is possible, for explanation of the surface pattern of the outcrops. The relative elevations of nearby surface exposures point to the possibility that an early Eagleford stream channel was cut down into the Woodbine and was later filled with sand. The upper surface of this sand filled channel and the Woodbine surface were then covered with a shallow water littoral deposit of gravels, reworked shells and shell fragments. With either interpretation, an observer of the Tarrant Station locality must believe that the fossil association of Acanthoceras aff. rotomagense, Exogyra columbella, and Ostrea soleniscus indicates an association of the living animals in the earliest Eagleford sea.

The writer, in company with S. A. Thompson and with others, has followed the conglomeratic Ostrea soleniscus - Exogyra columbella zone from Tarrant Station northward through Grapevine to Lewisville, in Denton County. Northward from Tarrant, sands which resemble typical Woodbine sands wedge in above the conglomeratic shell zone, and interfinger with typical Eagleford shales. A few limestone lenses are to be seen above the thickened conglomeratic shell zone and below these sands. With Dr. Gayle Scott and S. A. Thompson, the writer shares the opinion that the Lewisville beds of Hill, which are well exposed in the vi-

cinity of Lewisville, Denton County, (12) are the thickened northward continuation of the basal conglomeratic shell zone of the Tarrant Station locality and are earliest Eagleford in age.

It is certain that if any diagnostic value can be given to Ostrea soleniscus in the Tarrant County area it is as a basal Eagleford fossil.

The presence of Ostrea soleniscus in the volcanics of the Medill-Woodland area, in beds which are assigned to the Eagleford on the basis of the ammonites, shows that Ostrea soleniscus is a fossil which has a greater upper range than the restricted Woodbine range which some paleontologists wish to give it. Whether or not the viewpoint can be maintained that the Lewisville beds are earliest Eagleford in age, is a question; but the use of Ostrea soleniscus as a Woodbine key fossil can no longer be upheld in the light of field evidence.

The final determination of the exact relationship of the Lewisville beds to the Pine Bluff Volcanics can only be determined by detailed field work in the area between Grayson County and Denton County.

The Woodbine flora from Arthur's Bluff, Lamar County, described by Berry (5) is stated by him to have come "entirely from the single horizon represented at Arthur's Bluff on Red River" (5; page 157).

At the plant bearing horizon at Arthur's Bluff, by far the best collecting is in the clay-tuffaceous sand zone intervening between the "Upper and Lower Cannon Ball" Zones of the Pine Bluff Volcanics. It is surmised that the collections which Berry studied came from this zone which is here about 20 feet thick. The Upper part of the "Lower Cannon Ball" Zone is exposed in the river bank; the "Upper Cannon Ball" Zone is not exposed at Arthur's Bluff but may be seen to good advantage two miles west of Arthur City in a new quarry.

As previously noted (see PLATE 3) the clay-tuffaceous sand wedge between the two "cannon ball" zones, which is the plant bearing horizon of Arthur's Bluff, thickens westward from Golden Bluff and at the Choctaw Creek locality in Grayson County this wedge carries marine fossils although it still maintains its tuffaceous character. It was not examined at this locality for plant remains.

The presence of Metengonoceras dumbli in the shales formerly exposed at Slate Shoals (3, page 425) which are stratigraphically below the Pine Bluff Volcanic Zone and therefore stratigraphically below the Arthur's Bluff plant locality gives a lower Eagleford age to Berry's Woodbine flora of Arthur's Bluff.

Berry has shown that the Woodbine flora of Arthur's Bluff has 9 species in common with the Bingen of Southwestern Arkansas (Berry, E. W., Torrey Bot. Club Bull. Vol. 44, 1917). The Bingen as originally defined (29), was inclusive of the Tokio and Woodbine formations, which latter formations were defined for southwestern Arkansas by Miser and Ross (17) and by Dane (11).

Of the 151 described species of the flora of the Tuscaloosa (Berry, E. W., U. S. G. S., P. P. No. 112, 1919) there are 22 species common to the Woodbine of Arthur's Bluff and the Tuscaloosa. Berry states that (5, page 157) "The Woodbine and Tuscaloosa floras have 22 species in common, so that it seems clear that the Woodbine and Tuscaloosa formations are equivalent, at least in part."

SUMMARY & CONCLUSIONS

Subsurface work in southern Arkansas and northwest Louisiana indicates the stratigraphic equivalency of the volcanic "Woodbine" of the outcrop in southwest Arkansas, and the fossiliferous marine Eagleford of the subsurface of northwest Louisiana.

Detailed field work in Red River, Lamar and Grayson Counties, shows that the section with clay predominating in an area embracing portions of Red River and Lamar Counties contain three principal volcanic zones; of which the middle zone, the Kanawha Volcanic Zone, is characterized by the presence of Ostrea soleniscus, a supposed key fossil of the Upper Woodbine. Metengonoceras dumbli, an Eagleford ammonite, is reported by Adkins in clays which occur stratigraphically below the base of the lower volcanic zone; Metococeras swallovi and Exogyra columbella, the latter associated with Ostrea cf soleniscus were found in the clay section above the lowest volcanic zone. Eagleford age is therefore assigned to the sections exposed in Lamar and Red River Counties which heretofore were considered to be Woodbine in age.

The volcanic "Woodbine" of southwestern Arkansas has been correlated with the volcanic rocks of Red River, Lamar and Fannin Counties, Texas, by Ross, Miser and Stephenson, the correlation based upon lithologic similarity of the volcanic rocks of the two areas, the similarity of the flora of the volcanic rocks of the two areas and continuity of the zone of volcanic rock outcrops (20). It would be difficult to disprove this correlation, since it is based upon well grounded evidences.

Recent field work has demonstrated that the volcanic rocks in these northeast Texas Counties are Eagleford in age. Therefore the equivalent section in southwestern Arkansas, the "volcanic" Woodbine, is Eagleford; an interpretation which was first indicated by study of the subsurface of southwest Arkansas and northwest Louisiana.

Berry's Woodbine flora of Arthur's Bluff, since it was found in a horizon stratigraphically above Metengonoceras dumbli, is lower Eagleford in age.

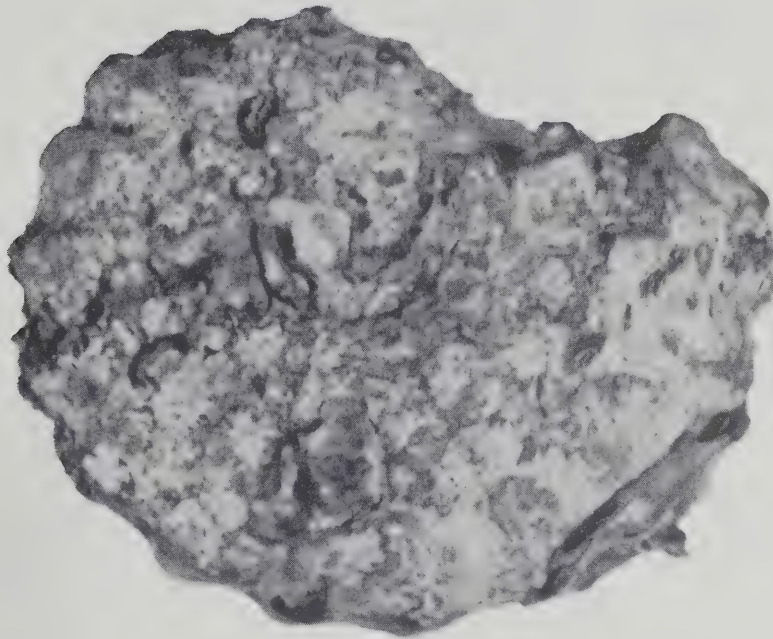
The Woodbine transgression from west to east through Oklahoma and Arkansas mentioned by Stephenson (24, page 5), is now known to be an Eagleford transgression. The unconformable contact of the Tokio and volcanic "Woodbine" of southwest Arkansas does not represent a hiatus in Eagleford time; it is the same unconformable contact seen to the west in northeast Texas, between the Austin and the Eagleford.

The equivalency of the flora of the Woodbine of Arthur's Bluff and of the Tuscaloosa of Mississippi and Alabama, demonstrated by Berry, indicates that during the deposition of the Eagleford volcanic of northeast Texas and southwest Arkansas and the marine Eagleford of northwest Louisiana, Eagleford deposition, in part deltaic and in part marine, was going on in Mississippi and Alabama.

Since the volcanic "Woodbine" of southwestern Arkansas is not Woodbine in age, it has been deemed advisable to suggest a name for this group of rocks, the stratigraphic equivalent of which is recognized in the subsurface formations of southern Arkansas and northwestern Louisiana.

The settlement of Centerpoint in Howard County, Arkansas, is located within the area of the outcrops and within relatively short distances of the upper and

lower contacts of the formation. The name of Centerpoint Volcanic Facies has been chosen, the use of which implies that this group of rocks is a volcanic facies of the Eagleford formation of northeast Texas.



BIBLIOGRAPHY

- (1) Adkins, W. S. (1928) Handbook of Texas Cretaceous Fossils. Univ. Texas, Bull. No. 2838.
- (2) _____ (1931) Some Upper Cretaceous Ammonites in Western Texas, in Contributions to Geology, 1931. Univ. Texas Bull. No. 3101.
- (3) _____ (1932) The Mesozoic Systems in Texas in The Geology of Texas. Vol. 1, Part 2. Univ. Texas Bull. No. 3232.
- (4) _____ (1935) Symposium on the Major Unconformities in the Texas Geologic Section; Upper Cretaceous Unconformities in Texas, in Quarter-Centennial Memorial Volume of the Division of Natural Resources. Univ. Texas Bull. No. 3501.
- (5) Berry, E. W. (1922) The Flora of the Woodbine Sand at Arthurs Bluff, Texas. U. S. G. S. P. P., No. 129-G.
- (6) Böse, Emil (1927) Cretaceous Ammonites from Texas and Northern Mexico. Univ. Texas Bull. No. 2748.
- (7) _____ and Cavins, O. A. (1927) The Cretaceous and Tertiary of Southern Texas and Northern Mexico. Univ. Texas Bull. No. 2748.
- (8) Bramlette, M. N. (1924) Geological Notes: Bentonite in the Upper Cretaceous of Louisiana: Volcanic Rocks in the Cretaceous of Louisiana. A. A. P. G. Bull. Vol. 8, No. 3.
- (9) Cragin, F. W. (1893) A Contribution to the Invertebrate Paleontology of the Texas Cretaceous. Geological Surv. of Texas 4th. Annual Report.
- (10) Crider, A. F. (1924) Geological Note: Volcanic Ash in Northern Louisiana. A. A. P. G. Bull. Vol. 8, No. 4.
- (11) Dane, Carle H. (1929) Upper Cretaceous Formations of Southwestern Arkansas. Arkansas Geological Survey, Bull. No. 1.
- (12) Hill, Robert T. (1900) Geography and Geology of the Black and Grand Prairies, Texas. U. S. G. S. Twenty-first Annual Report.
- (13) Inlay, R. W. (1937) Stratigraphy and Paleontology of the Upper Cretaceous Beds along the Eastern Side of Laguna de Mayran, Coahuila, Mexico. Bull. G. S. A. Vol. 48, No. 12.
- (14) Jones, T. S. (1938) Geology of Sierra de la Peña and Paleontology of the Indidura Formation. Bull. G. S. A. Vol. 49, No. 1.

- (15) Matson, G. C. and Hopkins, O. B. (1917) The De Soto-Red River Oil and Gas Field, Louisiana. U. S. G. S. Bull. 661-C.
- (16) Miser, H. D. and Purdue, A. H. (1918) Gravel Deposits of the Caddo Gap and De Queen Quadrangles, Arkansas. U. S. G. S. Bull. 690-B.
- (17) _____ and Ross, C. S. (1925) Volcanic Rocks in the Upper Cretaceous of Southwestern Arkansas and Southeastern Oklahoma. Amer. Jour. Sci., Vol. IX.
- (18) _____ and Purdue, A. H. (1929) Geology of the De Queen and Caddo Gap Quadrangles, Arkansas. U. S. G. S. Bulletin No. 808.
- (19) Moreman, W. L. (1927) Fossil Zones of the Eagleford of North Texas. Journal of Paleontology, Vol. 1, No. 1.
- (20) Ross, C. S; Miser, H. D; and Stephenson, L. W. (1928) Water-Laid Volcanic Rocks of Early Upper Cretaceous Age in Southwestern Arkansas, Southeastern Oklahoma and Northeastern Texas. U. S. G. S., P. P. #154-F.
- (21) Scott, Gayle (1926) The Woodbine Sand of Texas interpreted as a Regressive Phenomenon. A. A. P. G. Bull. Vol. 10, No. 6.
- (22) Shuler, E. W. (1918) The Geology of Dallas County. Univ. Texas Bull. No. 1818.
- (23) Stephenson, L. W. (1918) A Contribution to the Geology of Northeastern Texas and Southern Oklahoma. U. S. G. S., P. P. No. 120-H.
- (24) _____ (1927) Notes on the Stratigraphy of the Upper Cretaceous Formations of Texas and Arkansas. A. A. P. G. Bull. Vol. 11, No. 1.
- (25) _____ (1928) Correlation of the Upper Cretaceous or Gulf Series of the Gulf Coastal Plain. Amer. Jour. Sci. Vol. XVI. 5th. Series No. 96.
- (26) _____ (1929) Unconformities in the Upper Cretaceous Series of Texas. A. A. P. G. Bull. Vol. 13, No. 10.
- (27) _____ and Reeside, J. B., Jr. (1938) Comparison of Upper Cretaceous Deposits of Gulf Region and Western Interior Region. A. A. P. G. Bull. Vol. 22, No. 12.
- (28) _____ and Monroe, W. H. (1938) Stratigraphy of Upper Cretaceous Series in Mississippi and Alabama. A. A. P. G. Bull. Vol. 22, No. 12.
- (29) Veatch, A. C. (1906) Geology and Underground Water Resources of Northern Louisiana and Southern Arkansas. U. S. G. S., P. P. No. 46.

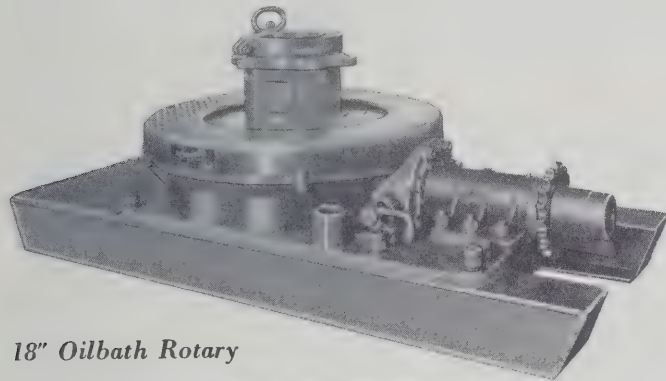
- (30) Wilmarth, M. Grace (1938) Lexicon of Geologic Names of The United States;
Parts 1 and 2. U. S. G. S. Bull. No. 896.
- (31) Winton, W. M. and Adkins, W. S. (1919) The Geology of Tarrant County.
Univ. Texas Bull. No. 1931.
- (32) _____ and Scott, Gayle (1922) The Geology of Johnson County.
Univ. Texas Bull. No. 2229.
- (33) _____ (1925) The Geology of Denton County. Univ. Texas Bull.
No. 2544.

The Name BREWSTER

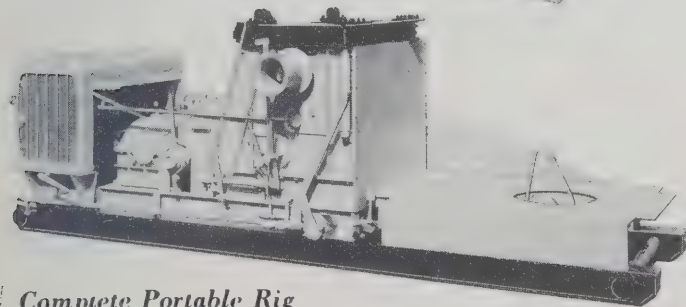
Synonymous with Fine Oil Field Equipment for More Than 30 Years



An obliging little shop in Oil City, Louisiana, to the largest manufacturing plant in the state devoted exclusively to the manufacture of oil field equipment—this is the history behind the name BREWSTER.



18" Oilbath Rotary



Complete Portable Rig

From this modern manufacturing plant comes fine equipment that drills and produces oil wells in the far corners of the world as well as in our own domestic fields.

A full line of oil field equipment is manufactured, including:

Oilbath Rotaries

Portable Rigs

Crown Blocks

Traveling Blocks

Tubing Heads

Casing Heads

Complete High Pressure Pre-Tested
Well Assemblies

Drag Bits

Wire Line Core Barrels

THE BREWSTER COMPANY, INC.
PHONE 2-3181 **SHREVEPORT, LA.**

Branch Stores: Lake Charles, New Iberia, Houma, Rodessa, Bunkie.

Export Office: Acme Well Supply Co., 136 Liberty St., New York City.

W. C. SPOONER

CONSULTING GEOLOGIST



ATLAS BUILDING

SHREVEPORT

--

--

--

LOUISIANA

A. F. CRIDER

CONSULTING GEOLOGIST



CITY BANK BLDG.

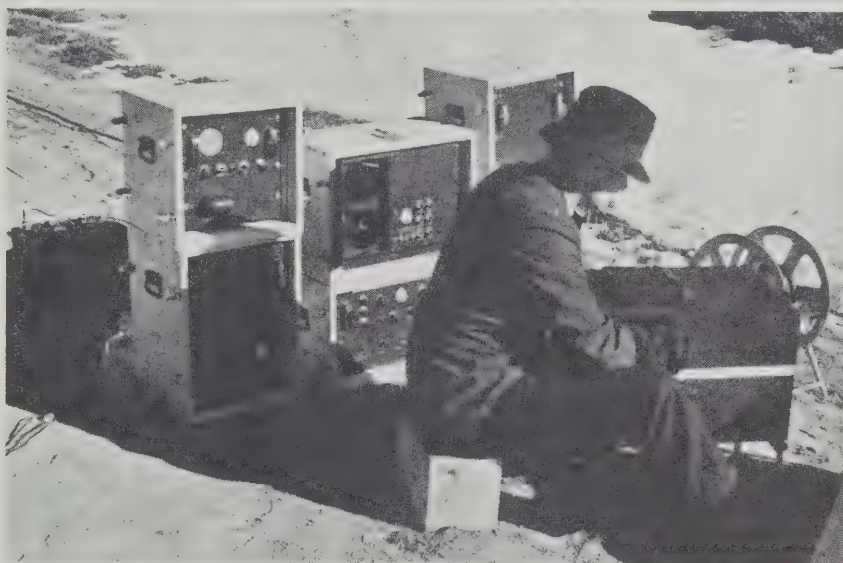
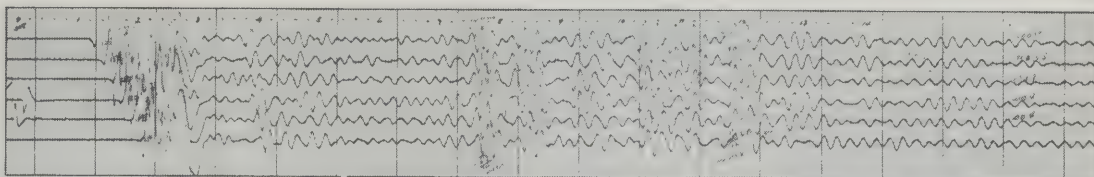
SHREVEPORT

--

--

--

LOUISIANA



PORTABLE SEISMIC EQUIPMENT for AREAS NOT EASILY ACCESSIBLE

Compact units especially designed for easy transportation and reliable operation in areas where the use of truck mounted equipment is prohibitive. Highest quality, yet reasonably priced.



H. R. C. EQUIPMENT IN USE ON FIVE CONTINENTS



For Equipment or Consulting Service Write

HEILAND RESEARCH CORPORATION

—Denver, Colorado—

NOTES ON THE COMANCHE AND PRE-COMANCHE ?
MESOZOIC FORMATIONS OF THE ARK-LA-TEX AREA:
AND A SUGGESTED CORRELATION WITH NORTHERN MEXICO

BY
ROY T. HAZZARD

INTRODUCTION

During the past several years deep drilling developments in the Ark-La-Tex area have contributed considerable detailed knowledge of the rocks underlying the known Trinity. The presence of these older rocks could not be forecasted from a knowledge of the known surface exposures of the oldest Mesozoic rocks in the area.

For proper use of the newly acquired stratigraphic knowledge, it became necessary to establish a suitable nomenclature, which would serve the practical purpose of standardizing formation names among the geologists of the Ark-La-Tex area.

The nomenclature committee of the Shreveport Geological Society prepared a preliminary report in which various formation names were proposed. This report was submitted to members of the Society for consideration and approval; subsequently, with certain modifications it was approved and accepted.

The nomenclature adopted by the Shreveport Geological Society has been used in recent publications dealing with the geology of South Arkansas (31) and Northern Louisiana (9).

Although it is probable that changes may be made in the regional correlations of the older stratigraphic units of the Ark-La-Tex area, it is improbable that there will be any changes in the new names adopted for these units, since their use is now widespread among geologists of this region.

Acknowledgment

The writer is indebted to the officials of the Gulf Refining Company for permission to publish this paper. The writer wishes to acknowledge the contributions of Drs. Gayle Scott, W. D. Adkins and R. W. Inlay, who have studied the fossils sent to them by the writer and who have expressed freely their viewpoints on the correlation problems.

Lists of fossil determinations, with notes on stratigraphy and correlations, by Dr. Adkins and by Dr. Scott are included in this paper.

The writer has had numerous fruitful discussions with Dr. Adkins and Paul Weaver, both of whom are well acquainted with the geography and geology of certain portions of Mexico, concerning the possible relationships of the Mexican Comanche section and that of Louisiana and Arkansas. The writer also wishes to acknowledge the ideas and suggestions of the many geologists of the Ark-La-Tex area with whom he has discussed certain features embodied within the paper.

COMANCHE & PRE-COMANCHE ?
STRATIGRAPHY OF THE ARK-LA-TEX AREA

The following table of new geological names is the one published by Grage and Warren in a report of the Lisbon Field, Claiborne Parish, Louisiana (9); a few additions have been made to the original.

NEW GEOLOGICAL NAMES
COMANCHE CRETACEOUS AND OLDER ROCKS
ARK-LA-TEX AREA

WASHITA & FREDERICKSBURG--Undifferentiated	
COMANCHE SERIES	PALUXY FORMATION. Non-marine upper Trinity sands grading southward and southwestward into marine. (Oil-producing zones of Caddo district and De Soto-Red River field in upper part of Paluxy; oil at Pleasant Hill; Gas in Bethany Field; Oil in Garland City Field).
	UPPER GLEN ROSE FORMATION. Marine limestones, shales, sandstones, and thin anhydrite stringers (3100 foot oil horizon of Sligo).
	GLEN ROSE ANHYDRITE. Massive anhydrite
	LOWER GLEN ROSE FORMATION. RODESSA MEMBER. Marine limestones, oolites, coquinas, shales, and thin anhydrite stringers. (Oil-producing zones of Rodessa in this member. Also Jeter Zone of Sligo; gas at Logansport field and Kilpatrick gas zone of Sugar Creek field; oil-producing zone of Stamps). PINE ISLAND MEMBER. Dark shale, some brown shale in lower part. Limestone at base locally. (Dixie and Dillon producing zones of Pine Island in this member; also Pettit zone of Sligo and Shreveport Fields; Patton zone of Lisbon field and the Darrett zone of Sugar Creek).
PRE-COMANCHE (?) SERIES	"TRAVIS PEAK" FORMATION. Non-fossiliferous red shales, siltstones, mudstones, and sandstones. (Herndon sand of Pine Island; Holloway sand of Cotton Valley in top of "Travis Peak." Darrett oil sand of Sugar Creek and Carter sand lens in top of "Travis Peak" and in basal part of Darrett zone). Basinward interfingers into a continuous marine section of dark shales and limestones.
	COTTON VALLEY FORMATION. Dark marine fossiliferous shales and limestones in northwest Louisiana. (Oil and gas in the "D" and Bodcaw sands of Cotton Valley field). SCHULER FACIES of Cotton Valley formation. Non-marine red shales, mudstones, siltstones, and sandstones. Typically developed in the Schuler field, Union County, Arkansas, and in extreme northeastern part of Louisiana. (Oil in the Morgan sands near top and Jones sand at base in Schuler field).
	BUCKNER FORMATION. Red and green shales, anhydrite, streaks dolomitic limestone and sandstones.
	SMACKOVER LIMESTONE. Buff limestone with Reynolds oolitic member at top. (Gas and distillate at Snow Hill; oil at Buckner, Village, Magnolia and Atlanta; gas and oil at Schuler). Represented in North Louisiana by dark shales and dark shaly limestones.
	EAGLE MILLS FORMATION. Red shales, mudstones, sandstones, anhydrite and salt.

The Pre-Trinity (?) (Pre-Comanche) ? formations shown in this table should be placed in Adkins' redefined Trinity Group (2; page 284).

It is the writer's opinion that the use of the term "Travis Peak," to designate the 1800 to 2500 feet of red beds and sandstones below the Lower Glen Rose, is incorrect since the ammonites of the lower part of the Pine Island member are the ammonites of the Cow Creek beds of the type Travis Peak of Central Texas. The term "Travis Peak" however, has become so strongly entrenched in the geological literature of North Louisiana and South Arkansas that the Nomenclature Committee of the Shreveport Geological Society decided to continue its use as descriptive of a lithologic unit.

The following correlation chart is presented; the correlations however, may not be acceptable to all of the geologists of this district. Although the stratigraphic column of the Ark-La-Tex area has some features in common with described sections of Northern Mexico and far West Texas which are suggestive of the correlations, there is insufficient paleontologic information at this time to make the correlations more than tentative.

Formation	Character	Average Thickness	Correlation
Paluxy	Red and gray mudstones, sands and thin limestones.	1300' Max.	ALBIAN
Upper Glen Rose	Limestone, shale and sands; and thin anhydrite. Red equivalents shoreward.	475'	In part equivalent to mountain making limestones of Northern Mexico
Glen Rose Anhydrite	Anhydrite, with thin shales and limestones.	250-500'	
Lower Glen Rose Rodessa Member	Oolitic limestone, limestone and anhydrite, sands and shale	600' Plus	ALBIAN
Pine Island Member Upper Part	Dark shales and thin limestones. (Red equivalents shoreward).		
Pine Island Member Lower Part	Limestone and shales. (Red equivalents shoreward).	200-400'	APTIAN Travis Peak of Texas & Cuchillo of N. Mexico.

Formation	Character	Average Thickness	Correlation
"Travis Peak" (so-called)	Red and gray shales and sands; basinward, red shales, sands and foss. ls. and shale	1800-2500'	APTIAN & NEOCOMIAN Las Vigas of Northern Mexico.
--- disconformity ? ? ---			
Cotton Valley	Dark shales, lime- stones, sands (Schuler facies with red beds shore- ward).	2000' $\pm$	LOWER NEOCOMIAN
--- disconformity ? -- locally unconformable ---			
Buckner	Red and green shales, anhydrite, thin dolo- mites.	100-400'	JURASSIC ?
Smackover Limestone	Upper part oolitic and chalky limestone--lower part dense banded lime- stone and black shale-- represented in northwest Louisiana by dark shales and limestones; in north- east Louisiana by lime- stones, sandstones and dark shales.	450-900'	JURASSIC ?
Eagle Mills	Salt, red beds and anhydrite--salt basin- ward--red beds and anhydrite shoreward.	1100' $\pm$	JURASSIC ?

AMMONITES REPORTED FROM THE LOWER GLEN ROSE

For several years the writer has been collecting ammonite bearing cores from deep wells drilled in Northwest Louisiana; as well as available records of ammonites secured by others. As a record for those interested in this type of information, the following tabulations have been prepared. All ammonite bearing cores were from the lower Glen Rose formation.

PINE ISLAND

Dixie Oil Co., Dillon #43

13-21N-15W., Caddo Parish, La.

Depth Base Massive Anhydrite: 2690' Est.

A specimen of the genus Douvilleiceras n. sp. was blown out of the Dixie Dillon #43 well, located in section 13-21-15W., in the Pine Island Field, Caddo Parish, Louisiana (2; page 318).

With casing seat at 3185 feet and top of the Dillon gas horizon at 3605 feet, this specimen came from an interval between 495 and 915 feet below the base of the massive anhydrite. This particular specimen was a limestone replacement. The section in the Dillon #43 well between depths of 3185 feet (the casing seat) and 3600 feet (the top of the Dillon oolitic limestone) is in large part black shale with thin limestone shells. It seems more probable that the Douvilleiceras may have come from the top of the Dillon oolitic limestone than from the black shales, although it is possible that any of the thin limestone shells in the black shale section might have contributed it. Since this specimen was blown out when the Dillon gas horizon was encountered, by far the more reasonable interpretation is that this ammonite in reality came from the porous gas saturated Dillon limestone (Pettit limestone of the Shreveport and Sligo Fields).

Dr. Scott has made the following statement concerning this ammonite:

"I have the specimen of 'Douvilleiceras' from the Dillon #43 well of Caddo Parish. As I told you in a previous letter, I do not believe this specimen is a true Douvilleiceras but is an ancestral type belonging to the genus Procheloniceras and should be Upper Aptian in age. Thus I should prefer to think as you do, that the specimen came from the upper part of the 'Dillon' oolitic limestone at the very bottom of the hole."

Shreveport Oil Corp., Muslow D-1

5-20N-15W., Caddo Parish, La.

Depth Base Massive Anhydrite: 3473'

Dr. Adkins has made a preliminary report on the cores from this well. He states:

"I was able to indicate certain things concerning the Ammonites, as you will find noted in the report. You know quite well that the identification of the other mega-fossils of the Aptian is still in a very uncertain condition. Very few of such fossils have been described in the literature and even these are not satisfactory. In addition, there is a large quantity of fossils and facies unknown to practically everybody."

4267 C (Two pieces) Limestone, salty taste, silty, dull blue-gray; Dufrenoya cf. texana (ribs sinuous, prominent bifurcations 2/3 way from venter to umbilicus).

4268 C Limestone, very silty, blue-gray; Dufrenoya three fragments (one with rib-bifurcation close to umbilicus); one pelecypod impression.

- 4268-70 C Shale, black, silty, slightly micaceous and carbonaceous; two Protocardia sp.; Anchura? sp.; one Anomia? sp.; fragment of an ammonite suture (cleaned and shellac applied to preserve) might be Pseudosaynella; another fragment like Protocardia.
- 4286 C Blue clay-shale; Protocardia; one ammonite fragment, family Aconeceras, genus uncertain, may be ?Pseudosaynella or ?Aconeceras (the fragment appears to have one sulcus but is coarser ribbed than anything in my collection).
- 4290-91 C Blackish clay-shale; Protocardia (small sp.), tubes (Vermetus?), Astarte, pelecypods, crustacean material; in one piece, a fragment showing three ribs of an ammonite, interspaces deep, whorl thick and rounded (might be ?Parahoplites; its form is somewhat like the Albian genus Neophylticeras, but is not that genus).
- 4295 C Blackish clay-shale; ammonites, form, ribbing and sulci are those of Pseudosaynella**, part with nacreous shell luster preserved; Protocardia sp. as above.
- ** Comparison with ammonites in my collection shows that it is closest to Pseudosaynella bicurvatum.
- 4296 C Blackish clay-shale; Protocardia as above; ammonite fragment suggests Parahoplites; Protocardia sp. as above; crushed tubes as above (?Monopleura).
- 4303-05 C Blue clay-shale, finely micaceous, non-calcareous; Exogyra like quitmanensis (juvenile), Protocardia and undetermined pelecypoda.
- (?) 4799-4800 C Blue-gray clay and gray ostream limestone; Exogyra quitmanensis.

Age: Dufrenoya Zone = Aptian = Travis Peak = Cuchillo

CONVERSE

Gay et al, Long Bell Lbr. Co. #A-1
10-8N-13W., Sabine Parish, La.
Depth Base Massive Anhydrite: 5715'

Black fissile shale cores from depths of 6626 to 6636 feet contained well preserved ammonite casts. These cores were sent by the writer to Adkins and Scott, both of whom reported Dufrenoya aff. dufrenoya Burckhardt.

LISBON

United Gas, Meadows #1
13-21N-5W., Claiborne Parish, La.
Depth Base Massive Anhydrite: 4005'

Cores from depths of 4825-34 feet were sent by M. C. Israelsky to Scott. The ammonites in these cores were considered Dufrenoya aff. dufrenoya by Scott at that time. The writer has misplaced some of Scott's correspondence so that his latest viewpoints on these particular ammonites cannot be quoted.

SIBLEY

Standard Oil Co. of La., Fudicker #1
 2-17N-19W., Webster Parish, La.
 Depth Base Massive Anhydrite: 5272'

Dr. Scott states the following regarding the ammonites from this well:

"The two specimens from the Standard Oil Fudicker #1 at depth 6202-06 are the best and their reference to Dufrenoya is in my judgement inescapable. I believe they come very close to Dufrenoya aff Dufrenoya Burckhardt. These specimens should therefore be upper Aptian in age."

CASPIANA

Prairie River Synd., Hutchinson #1
 15-15N-12W., Caddo Parish, La.
 Depth Base Massive Anhydrite: 4472'

Ammonites from the Caspiana well were sent by Mr. A. F. Crider to Dr. R. W. Imlay of the University of Michigan, who is quoted in the following statement:

"Dr. Kellum and I have just examined the samples from the deep well near Caspiana. Samples (5350-5367) and (5366-5384) contain ammonites resembling Parahoplites of the Travis Peak, i. e., upper Aptian."

Dr. Scott also examined a set of cores from the Caspiana well which were sent to him by the writer, and has reported as follows:

"In the ammonite impressions from the Prairie River Synd., Hutchinson #1, depth 5366-86, I recognize a specimen which I believe is identical with a new genus and species which I am describing as Rhytidhoplites robertsi. The other specimens from this well appear to be either Hypacanthoplites or Parahoplites or Dufrenoya. The ventral area is not visible and it is impossible to say to which genus they belong, but since they occur with Rhytidhoplites they cannot very well be Dufrenoya. Their regular, alternating primary and secondary costae suggest Hypacanthoplites. Rhytidhoplites occurs with Parahoplites and Hypacanthoplites in the upper Blue Marl section of the Cuchillo several hundred feet above Dufrenoya in the Quitman Mountain area. Incidentally these intervening several hundred feet of strata in the Quitmans contain numerous specimens of Sonneratia. No trace of this genus occurs in the Louisiana material. Possibly these strata are absent in Louisiana? There is in the material from this well a fair impression of an echinoid similar to a species which I have collected from the Upper Cuchillo."

SLIGO

Haynes Prod. Co., Murff #1
 36-17N-12W., Bossier Parish, La.
 Base Massive Anhydrite: 4324'

Dr. Imlay examined a set of cores from this well which were sent to him by the writer. Depths of the cores are questionable in several cases since the markings on the original bags were obliterated. Depths probably are correct within 100 feet. Dr. Imlay has made the following report:

"The core material has been examined and I agree with Adkins and

Scott that the lower part of the Pine Island Member is of upper Aptian age and represents the Travis Peak formation of Texas. Dufrenoya texana Burckhardt occurs in the core of Haynes-Murff #1 well at 5082-5102 and at 5128-5140. Species of Parahoplites occur at 5128-5140 and at 5140-47 ? Our Museum collections from Mexico contain dozens of specimens of Dufrenoya texana which show all the variations of the species. Consequently I feel certain of the above identification even if the Louisiana material is somewhat distorted. In any case, the genus, Dufrenoya, has been recorded only from deposits of upper Aptian age and is a good horizon marker."

Dr. Scott examined some cores from the Haynes, Murff well which came from depths of 5082-5102 and 5120-40 feet. He referred the ammonites to Dufrenoya.

Scott, Adkins and Imlay concur in the opinion that the Albian-Aptian contact should be placed in the lower part of the Pine Island Member of the Lower Glen Rose formation of North Louisiana, and that at least a portion of Hill's type Travis Peak of Texas (10, 2) is embraced within this member.

Dr. Scott kindly furnished the writer a summary of his viewpoints on the stratigraphy of the beds in North Louisiana, from which ammonites have been secured.

"From a study of these specimens I believe as you do, that the Aptian-Albian contact must occur somewhere in the lower 200-400 feet of the so-called Lower Glenrose of Louisiana - that is, in the interval 680'± to 890'± below the Anhydrite stringer. I suggest also that the lower Cuchillo, which in the Quitman Mountains and in Mexico consists of massive limestones, oyster beds, sandstones and sandy limestones reaching a thickness of nearly 2000 feet, may not be represented in Louisiana. These strata in the areas mentioned are characterized by the ammonite genus Sonneratia which has not been recovered in Louisiana, although this fact alone may have little significance. The Sonneratia beds do not occur in the section in the Solitario. At least I have not found them, but Douvilleiceras occurs there.

"The subsurface Trinity section of Louisiana has long been known to be very thick and the drill has not yet reached its base. Fortunately, ammonites and other data from a great many wells make it possible to postulate certain stratigraphic relationships. After a careful study of these data and much helpful correspondence with Roy T. Hazzard and others, the writer suggests that this underground section is similar to the Quitman Mountain section but thinner and with more stratigraphic breaks. For example, there may be an unconformity in the lower 200-400 feet of the so-called Lower Glenrose in Louisiana, marking the Aptian-Albian contact. Both middle Albian ammonites (Hypacanthoplites, Rhytidhoplites, etc.) and upper Aptian ammonites (Dufrenoya, Procheloniceras) have been recovered from this lower Glenrose section, but there is nothing to suggest that the lower Albian, which in the Quitmans consists of thick beds of limestone, shell beds, and sandstones (lower Cuchillo) with numerous specimens of Sonneratia, exists under Louisiana.

"The accompanying table is offered as a tentative correlation of the Louisiana and Quitman Mountain sections."

LouisianaQuitman Mountain Area

Paluxy

Upper Glenrose

GLENROSE

Massive Anhydrite

Upper part Lower Glenrose

Zone Parahoplites and Rhytidhoplites

BLUE MARLS OF CUCHILLO FORMATION

Disconformity ?

Limestones etc. of Lower Cuchillo
Zone of Sonneratia

Lower part Lower Glenrose

Zone of Dufrenoya

Travis Peak Formation

Zone of Procheloniceras ?Zone of Dufrenoya

Lower Trinity Red Beds (so-called "Travis Peak")

Las Vegas Formation

Disconformity ?

FOSSILS REPORTED FROM THE "TRAVIS PEAK"

The term "Travis Peak" Formation as used by geologists of the Ark-La-Tex area introduces an ambiguity into geological literature of the Trinity Group. The term is used to designate the non-fossiliferous red bed and sand series which underlies the Lower Glen Rose formation. The ammonite records from deep wells in North Louisiana show conclusively that Hill's type Travis Peak of Texas is represented in North Louisiana in the Pine Island Member of the Lower Glen Rose formation. Additionally, to the southward the non-fossiliferous "Travis Peak" of northern Louisiana and southern Arkansas begins to develop marine wedges of fossiliferous limestones and shales, which are interbedded with red shales and sands. The most northerly well in which this facies change has been observed, is the Prairie Syndicate well located in section 15-15-12W., Caddo Parish, near Caspiana, approximately 15 miles southeast of Shreveport.

The top of the "Travis Peak" is placed at a depth of 6000 feet in this well by the writer, dependent upon a study of cores and interpretation of an electrical log.

Mr. A. F. Crider sent fossiliferous cores of the "Travis Peak" to Dr. Imlay who has made the following comments:

"Samples 6060-80' and 6470-90' contain various pelecypods which remind Dr. Kellum of older beds, i. e., Neocomian or possibly Upper Jurassic. We have made many fine collections from the Upper Jurassic and Lower Cretaceous beds of Mexico and plan to study them during the next few years. When these studies are made it may be possible to identify the pelecypods in your samples and determine their horizon."

"Last year I studied early Cretaceous fossils from Mexico and this year I am working on the upper Jurassic faunas. The oysters in your samples have rather rounded umbonal crests which suggests that they do not come from the highest Jurassic or earliest Cretaceous (i. e., Tithonian or Berriasian) beds in which many of the oysters are characterized by an acute umbonal ridge.

It will take two or three years more to finish the studies of the Mexican fossils in our collections and perhaps during that time it will be possible to place some of the pelecypods in your collections. The presence of oysters definitely excludes beds older than the Jurassic and our studies in Mexico have shown that the two most likely times for red bed formation are the Upper Jurassic (Oxfordian to Tithonian) and part of the Lower Cretaceous (upper Hauterivian to lower Aptian). It seems likely that the red beds of Louisiana probably represent the latter time."

Dr. Imlay recently informed the writer that he was planning to examine a set of fossiliferous cores from the Gulf Refining Company-Goodpine well, located in Bienville Parish. This well was drilled to a total depth of 10,770 feet. The "Travis Peak" in this well was represented by a marine section of limestones and shales, the upper part of which was made up of interbedded fossiliferous limestones and shales and red shales and sandy shales all of which were fairly fossiliferous. The cores from this well may supply some paleontological information which will aid in making a proper correlation of the "Travis Peak."

FOSSILS REPORTED FROM THE COTTON VALLEY FORMATION

There is little information available on the fossils of the Cotton Valley formation. Dr. Imlay examined some fossiliferous cores from the Magnolia Pet. Company's Pardee C-1 well, located in section 17-23N-11W., Webster Parish, Louisiana (depth 9470-9790) and from the Magnolia Pet. Company's Sexton #1 well, located in section 32-23N-9W., Webster Parish, Louisiana (depth 9415-9418). These fossiliferous cores were given to the writer by Mr. L. R. McFarland.

Dr. Imlay has made the following statement regarding the fossils:

"The main problem is the determination of the age of the beds below the Glen Rose sub-group. I have compared the pelecypods in the various cores with the Mexican Neocomian and Jurassic pelecypods, which I have been studying this year, but find nothing in common except possibly a Pseudomonotis which occurs in all the samples from Pardee C-1 and from Sexton Unit #1 in both samples. This species is very similar to an undescribed species from the Kimmeridgian stage of the Upper Jurassic of Mexico. However it is not safe to base a correlation on one species of pelecypod which belongs to a genus as highly variable as Pseudomonotis."

Fossiliferous cores from the Furlong #1 Clarke well, located in section 10-T20N-R7E., Morehouse Parish, Louisiana, were sent by Mr. M. N. Broughton to the U. S. G. S. for examination. The following report was received from Mr. Julian D. Sears. The cores were examined by Mr. J. B. Reeside, Jr., and Mr. T. W. Stanton.

Cotton Valley Formation
Cores 5240-5256

"The upper horizon of fossils (5240-5256) in the Cotton Valley formation* contains only forms that are interpreted as fresh-water and brackish-water types. Among the normally fresh-water forms are pelecypods close to the genus Sphaerium, a flat-coiled gastropod like Planorbis, cyprid ostracodes, and the same species of Estheria as that in the Buckner formation.* The normally brackish-water forms include a simple oyster and a species of Volzella. An undetermined pelecypod that might be a Corbicula or a marine species is associated with the oyster. The assemblage of nonmarine forms is not by itself a very definite basis for a judgment of age, but the age would seem to be not older than Cretaceous."

"Inasmuch as the species of Estheria occurs in both the Buckner formation* and the Cotton Valley formation* and the rock type of such samples as No. 6** is like that of the lower samples, there does not appear to be any valid reason for supposing the Buckner formation* to be greatly older than the Cotton Valley formation.* In west Texas, New Mexico, and Arizona red strata are intimately associated with beds containing marine Trinity fossils. The assumption might be allowed that in the Louisiana region a similar association occurs and that the 'Cotton Valley Formation' * and the Buckner Formation* both belong to the middle Lower Cretaceous."

* New names inserted by writer.

** No. 6 -- red and green shale; other Cotton Valley cores were dark shales and limestone and green shales.

FOSSILS REPORTED FROM THE BUCKNER FORMATION

Two cores of fossiliferous red and green shale from the Buckner formation of the Furlong #1 Clark well, located in section 10-20N-7E., Morehouse Parish, Louisiana, were sent by Mr. M. N. Broughton to the U. S. G. S. Mr. Reeside, Jr. and Mr. Stanton reported on these fossils.

Buckner Formation
Cores 5903-5904

"The lower horizon of fossils (5903-5904) in the Buckner formation* contains only one form, a species belonging to the usually fresh-water crustacean genus Estheria. The species of Estheria have not been worked out well enough to permit them to be used alone for age-determination."

* New name inserted by writer.

FOSSILS REPORTED FROM THE SMACKOVER LIMESTONE

The fossils of the upper part of the Smackover Limestone have been carefully studied by Dr. Adkins; and through the courtesy of Mr. W. B. Weeks, a copy of a report by Dr. Adkins on the mega-fossils found in Smackover Limestone cores from the Phillips-Arnold #1 well, located in section 27-15S-15W., Ouachita County, Arkansas, is attached.

MEGAFOSSILS
from
SMACKOVER LIMESTONE
OUACHITA COUNTY, ARKANSAS
PHILLIPS, ARNOLD NO. 1
(CORES 4951-5072 FEET)
BY
W. S. ADKINS
SHELL OIL CO.

SUMMARY

"The age of megafossils from cores of oolitic Smackover Limestone from the Phillips, Arnold No. 1 well, Ouachita County, Arkansas, is bracketed below the Dufrenoya zone of the Upper Aptian, and probably above the Malone Upper Jurassic (Kimmeridgian-Portlandian). What Neocomian age they represent is uncertain, but Upper Neocomian is more probable. Their age determination awaits more fossils. Comparison of the Louisiana Lower Cretaceous with similar thick synclinal sections in Arizona, New Mexico, Chihuahua and the southern Quitman Mountains in Hudspeth County, Trans-Pecos Texas, is noted."

1. "Trigonia sp. aff. stolleyi Hill: This is less inflated than either Hill's type figures of T. stolleyi or Cragin's cotypes of T. proscabra, of which Dr. J. B. Reeside kindly sent me plaster squeezes. Like both these species, it has radial rib striae, but the tops of the ribs are not beaded as in the proscabra cotypes. (This feature is not shown in Cragin's Pl. X, fig. 5). The ribs do not make the sharp angle near the escutcheon shown in Cragin's Pl. X, figs. 3 and 5.

2. Trigonia sp. 2: At 4966-71 feet one smooth ribbed Trigonia has the shape of T. praestriata (Cragin Pl. X, fig. 7) but differs from this and all other Malone species; it lacks the ventral rib angulation of T. praestriata.

3. Astarte sp.: This common species is more inflated and the ribs more beaded than in A. breviacola (Cragin Pl. XI, fig. r); it is smaller, more inflated and more coarsely ribbed than Eriphyla pikensis (Glen Rose).

4. Protocardia sp.: This species was not clearly identified; the genus is common in the Trinity but unreported in the Malone Jurassic.

5. Leda sp.: Not like Malone Jurassic, but suggestive of Cuchillo.

6. Pecten cf. stantoni Hill: This small immature form is unlike anything in the Malone Jurassic (where a small Entolium is abundant). Its double ribbing and shape suggest Pecten stantoni (Trinity), but unfortunately no small specimens of that species are available.

7. Nerinea sp.: Not like Malone Jurassic, but most like Trinity.

REMARKS:

"Since Neocomian megafossils (not including ammonites) from Northern Mexico and the Southwestern United States remain practically unde-

scribed, it is still very difficult to distinguish the megafossils of the following important levels:

(1) Upper Jurassic, including Kimmeridgian-Portlandian* and Malone Jurassic; (2) Lower Neocomian, including Valanginian; and (3) Aptian, put by some authors as uppermost Neocomian, including Cuchillo (basal part at least), and the Louisiana Lower Glen Rose. These three levels contain many genera in common, and the three contain rather similar species, doubtless distinguishable after further study, but at present confusing. Of the other two promising lines of evidence, ammonites have not yet been found in sufficient numbers below the Dufrenoya zone, but when found, will doubtless give good age indications; and microfossils have not yet been sufficiently investigated.

These Smackover megafossils were submitted to Dr. C. C. Albritton to discover any possible similarities to the Malone (Upper Jurassic) faunas, with the following results. The striate-ribbed Trigonia is probably different from either T. proscabra (Upper Jurassic) or T. stolleyi (Glen Rose). T. proscabra did not persist to the top of the Malone Jurassic; it died out in the Idoceras zone (=Kimmeridgian, Upper Jurassic). The smooth ribbed Trigonia (4966-71 feet) is not T. praestriata Cragin, and there is nothing to indicate its Malone age. The large Nerinea and the other gastropods do not look like Malone species. The Astarte is more inflated than the Malone species and is differently ribbed. The following negative evidence also might weigh against the Malone age of these fossils: absence of characteristic Trigonia of many species, including thick-shell forms; absence of characteristic Entolium, Ctenostreon, Gryphaea, Nerinea. In conclusion, positive and negative evidences both indicate that this Smackover fauna is probably not of Malone Jurassic age.

On the contrary, the fauna has considerable resemblance to Trinity, particularly Cuchillo. To test this point, the fossils were submitted to Dr. Gayle Scott for examination. He reports as follows: The Astarte and Leda are not like the Malone but are most like the Cuchillo; the large Nerinea looks like Cuchillo; the striate Trigonia is a new species and could be from any level. 'An impression of a large Nerinea is closely similar to specimens of Nerinea which occur in the Cuchillo limestones northwest of Quitman Summit in the southern Quitman Mountains. The specimens of Trigonia are definitely not like the Malone Jurassic material, and small specimens of Astarte do not appear to be Jurassic, but this determination is less definite than the others.' It is not to be concluded that this fauna is of Glen Rose age. These genera, and probably the species, may range downwards through a considerable thickness of section. Lasky described in the Little Hatchet Mountains, southwestern New Mexico, 17,000-21,000 feet of Trinity rocks, in which Orbitolina has a vertical range of at least 12,000 feet. Scott has measured 12,000 feet

*Following Spath's revision of the Jurassic stages, Pal. indica., n.s., Vol. 9, six parts, 1927-33.

of Cuchillo beds in the southern Quitman Mountains. R. E. King and W. S. Adkins made a reconnaissance survey of the Middle Conchos Valley, Chihuahua, including type and other sections of Aurora, Cuchillo and Las Vigas formations, where there is exposed several thousand feet of Aptian beds. The Louisiana Trinity section is a thick synclinal deposit like those mentioned.

In the Pure Oil Company, Kendrick #T-16 well, Limestone County, Texas, Lower Trinity marine* cores from 7725-8060 feet contain Entolium, Pleuromya, Exogyra cf. reedi Imlay, 'Rhynchonnella' sp., suggestive of the Valanginian near Miquihuana, Tamaulipas, (Mexico). Here again care in age determination is necessary, because Entolium, Pleuromya, Exogyra and brachiopods are known also from Upper Jurassic beds in northeastern Mexico."

* Cotton Valley Formation.

Fossiliferous cores of the lower portion of the Smackover Limestone from the Gulf Refining Company's Lewis Werner #49 well, located in section 5-16S-16W., Union County, Arkansas, were examined by Dr. Girty of the U. S. G. S. and by Professor R. C. Moore of the University of Kansas. These cores came from an interval between depths of 6400 and 6600 feet.

Dr. Girty made the following statements with regard to the fossils of the lower part of the Smackover Limestone.

"I distinguish only two species among the fossils shown, a small concentrically costate bivalve, which is abundant, and a tubular serpuloid shell, which is rare. A number of rather minute sub-globose specimens appear to be only young individuals of the larger more distinctly characterized species. For purposes of age determination the serpuloid has no value whatever. Forms similar to it are abundant in the Carboniferous, and have of recent years been referred under the genus Serpulopsis. Serpulopsis, where I have seen it, almost invariably occurs attached to other shells, and invariably attached to marine shells. (These fossils are unattached).

The bivalve hypothetically belongs to some Pelecypod genus or to the Crustacean genus Estheria. Aside from a general resemblance, these fossils lack any really distinctive character of Estheria and are, on the other hand, much too gibbous and apparently too substantial. In being abundant and in occurring practically without associated forms, these fossils, it is true, recall Estheria as it is found in our Carboniferous rocks, but the Carboniferous Estherias evidently owe their isolation to a habitat in fresh or brackish water, whereas the occurrence of these fossils, just the opposite, suggests supersaline conditions. Estheria, therefore, can be dismissed from the probabilities.

Before considering the relations of these shells as Pelecypods, two things should be noted in regard to them. Several specimens retain the valves in articulation, and these specimens make it clear that the shell was equivalve. Again, the circumstance that these fossils are at the same time abundant and are apparently segregated from every other form of life (except the serpuloid species) suggests that they lived under exceptional conditions of environment,--in this instance, as already noted, in waters with a high saline content. If the con-

ditions thus suggested were non-marine, this fact would forbid identifying these shells with any of the common Pelecypod genera except under the hypothesis that they represent a species which had managed to adapt itself to such conditions.

As equivalve Pelecypod shells these fossils might be considered in relation to several genera, such as Posidonomya, Monotis, Inoceramus,--all marine types.

Monotis, typically at least, developed radial costae, and it is questionable whether concentrically corrugated shells without radial costae could legitimately be referred to that genus. Monotis is especially abundant in, if not confined to, the Triassic. In the Carboniferous, however, there is a small group of equivalve pectinoid shells, possibly representing an undescribed genus, which resembles Monotis more or less closely and of which some species lack radial costae. None, however, is concentrically corrugated. It is the concentric corrugations of these shells (given, of course, their configuration) that especially suggests the genera Posidonomya and Inoceramus. Posidonomya, as recognized, has a very long range (from Silurian to Jurassic, according to Zittel,) whereas Inoceramus is especially characteristic of the middle and upper Cretaceous.

To make a long story short, the resemblance of these equivalve Pelecypods to Posidonomya, Inoceramus, or any other genus, is superficial, though Posidonomya offers the closest agreement."

Professor R. C. Moore has made the following comments on the fossils found in cores from the lower part of the Snackover Limestone.

"I have just spent some time breaking up and studying all materials discovered in the cores and may send on a preliminary statement now. (Lewis Werner No. 49, Union County, Arkansas). The only fossils I have been able to discover are some small bivalves, the largest about 15 mm. in diameter. These show clearly the concentric wrinkles and other features typical of the small Inoceramus, but lack of prismatic structures of the shell indicates difference from this genus. Presence of growth lines on the beak excludes Posidonia, which otherwise the shells resemble. Posidonia is a common Upper Paleozoic pelecypod. My present judgment is that the fossils are Mesozoic rather than Upper Paleozoic. I know of nothing comparable to these in our Upper Pennsylvanian or Permian, and I believe that the shells probably belong in the Ostreidae. There is a chance that they may be the bivalved crustacean Estheria but I have not been able to bare a hinge line and this study is so far preliminary. Estheria occurs both in Paleozoic and Mesozoic. These shells are much larger than ordinary Estheria and somewhat more irregular."

GENERAL CONSIDERATIONS

There is every reason to believe that the "Travis Peak" of the Ark-La-Tex area is transitional upward into the basal portion of the Lower Glen Rose formation. The Albian-Aptian contact occurs within the Pine Island Member of the Lower Glen Rose. The upper portion, at least, of the "Travis Peak" may be considered of Aptian age. In view of Dr. Inlay's comment that "studies in Mexico have shown that the two most likely times for red bed formation are the Upper

Jurassic (Oxfordian to Tithonian) and part of the Lower Cretaceous (Upper Hauterivian to lower Aptian)" and "it seems likely that the red beds of Louisiana probably represent the latter time," a tentative Upper Aptian to Upper Neocomian (Hauterivian) age range has been assigned to the "Travis Peak."

Any expression of opinion on the character and significance of the "Travis Peak"-Cotton Valley boundary is a reflection of individual viewpoints. Well data indicate that within the marginal portions of the Trinity basin of the Ark-La-Tex area, the basal gravels of the "Travis Peak" transgress across the Cotton Valley formation. The Pike Gravels of the Trinity outcrop of southwest Arkansas may be considered the visible northward continuation of the basal "Travis Peak" gravels found in the subsurface to the south. This transgressive relationship cannot be interpreted as proof of the existence of a hiatus between the "Travis Peak" and Cotton Valley, although it is suggestive that a minor hiatus may exist between these formations in the marginal portions of the basin.

The contact of the "Travis Peak" and the Cotton Valley formation may be recognized with a fair degree of accuracy as far southward as Bienville Parish, Louisiana. Geologists who have studied in detail the information furnished by cuttings, cores, and electrical logs of the many wells drilled in the Cotton Valley Field, and of the wells recently drilled in the Shongaloo Field, admit the difficulties in recognizing any evidences of a hiatus at the "Travis Peak"-Cotton Valley contact. In Bienville Parish, Louisiana, the "Travis Peak" appears to be transitional downward into the Cotton Valley and the recognition of the exact contact within the transitional zone must reflect an individual's choice based upon his judgment.

The writer's speculation is that the Cotton Valley formation is lower Neocomian in age.

The lower boundary of the Cotton Valley formation is set off sharply from the underlying formations by a marked contrast in lithology. This contact is easily recognized in electrical logs of wells drilled in South Arkansas and of certain deep wells drilled in Northern Louisiana. Weeks (31) has called attention to the conglomerate at the base of the Cotton Valley formation in the Schuler Field which here rests on the Smackover Limestone; the Buckner formation, which normally occurs above the Smackover Limestone being absent in the Schuler Field, due to post-Buckner-pre-Cotton Valley erosional truncation (Weeks: Schuler Field Report).

In the Magnolia field in Arkansas, an interpretation of data from deep drilling indicates the existence of hiatus between the Cotton Valley and Buckner formations. In the Atlanta field, the Buckner formation appears to be absent, with the basal Cotton Valley resting on the Smackover Limestone.

It is thought that several deep wells which have been drilled in North Louisiana, have penetrated the entire thickness of the Cotton Valley formation. A deep well in the Rodessa Field and a deep well in the Shongaloo field encountered zones of pebbly sandstones in sediments which are considered to represent the basal portion of the Cotton Valley formation. In both wells, the Cotton Valley formation was underlain by dark shales, without interbedded anhydrite, which are correlated with the Buckner formation.

The extent and magnitude of the indicated unconformity at the base of the Cotton Valley is conjectural; at the present time it appears to be confined to the areas of local uplift. Some geologists are of the opinion that a minor hiatus,

restricted to the peripheral portions of the basin, separates the Cotton Valley from the Buckner.

It appears to the writer that the Buckner formation, the Smackover Limestone, and the salt section, which underlies the Smackover Limestone (Eagle Mills time equivalent) should be considered as a continuous sedimentary sequence. In the Buckner field, W. K. Link has presented evidence which he interprets as indicating an unconformity between the Reynolds oolite and the Buckner formation (Link, Buckner Field). Elsewhere the Buckner formation appears to be transitional downward into the Smackover Limestone.

No transitional zone appears to exist at the base of the Smackover Limestone, dependent upon the interpretation of data from several deep wells located in Union and Ouachita Counties, which were drilled into salt. In these wells a thickness of approximately 30 feet of red sandy shale separates the base of the Smackover Limestone from the top of the salt. The contrast in rock types indicates a marked change in depositional environment. Dr. Girty has pointed out the peculiarity of the fauna of the basal part of the Smackover Limestone.

"Again, the circumstance that these fossils are at the same time abundant and are apparently segregated from every other form of life (except the serpuloid species) suggests that they lived under exceptional conditions of environment,--in this instance, as already noted, in waters with a high saline content. If the conditions thus suggested were non-marine, this fact would forbid identifying these shells with any of the common Pelecypod genera except under the hypothesis that they represent a species which had managed to adapt itself to such conditions."

It appears that in southern Arkansas the evaporites were followed by the deposition of a thin terrigenous wedge, which in turn was followed by the deposition of dense "banded limestones," in water of high salinity. Some of the limestones of the lower part of the Smackover Limestone may be evaporites. The thin black shale laminae in the "banded limestones" are quite significant to the writer, as later will be mentioned. The upper part of the Smackover Limestone seems to have been deposited under conditions approaching a normal marine environment in so far as the character of the fossils indicate the relative salinity.

The presence of anhydrite in the Buckner formation points to a recurrence of high salinity and an environment favorable for the intermittent deposition of evaporites.

In the areas to the north of Union and Ouachita Counties, Arkansas, the Eagle Mills formation occupies the stratigraphic position of the salt, which to the south underlies the Smackover Limestone. Red mudstones and red sandstones, with minor amounts of anhydrite, make up the Eagle Mills formation.

A number of wells in Ouachita and Dallas Counties, Arkansas, probably have been drilled through the contact of the Eagle Mills formation and the underlying Carboniferous. Core and cutting records from these wells are not available. The Gulf Refining Company's L. Werner #49 well, located in section 5-16S-16W., Union County, was drilled to a total depth of 7973 feet into igneous rock.

Following is the writer's interpretation of the lower part of the section encountered in the Werner well:

5735	Base Cotton Valley formation
5735-5920	Buckner formation
5920-6597	Smackover Limestone
6397-6597	Dense "banded" Limestone
6597-6631	Red sandy shale
6631-7488	Rock salt
7488-7545	Grayish white anhydrite
7545-7576	Red shale
7576-7600	Conglomerate with red shale matrix. Pebbles of diabase,* chert, silicified shale and dense sandstone.
7600-7938	Hard dense mudstones--reddish and purplish in color, silicified; 15-20° dips; near base vianlets of quartz and igneous rock cut mudstones. Stanley or older ?
7938-7973	Diabase* --intrusive contact with hornfels above.

* Petrographic determinations by C. L. Moody.

It is current opinion that the salt encountered in deep wells in the Rodessa Field, Louisiana, and in Panola County, Texas, is the equivalent of the Eagle Mills salt of South Arkansas; this salt horizon probably has contributed to the salt cores of the penetration salt domes of Northern Louisiana and west central Mississippi.

In addition to its importance as an oil producing rock, the Smackover Limestone, considered as a single stratigraphic unit, is a very interesting formation since a consideration of its lithologic features affords much opportunity for speculation as to the conditions under which it was formed, its extent, and particularly, its geologic age.

Lang and many other geologists have contributed to the knowledge of the Permian of West Texas. Lang's Figure No. 6 (25; page 847) illustrates a conception of the geographic relationships of reef, fore-reef and back reef deposits, to be seen on a grade scale at the south end of the Guadalupe Mountains in New Mexico and Texas, and in the Delaware Mountains of the adjacent portion of Texas.

The writer is of the opinion that five deep wells in Northern Louisiana have drilled into the stratigraphic equivalent of the Smackover Limestone, one of which drilled through the entire section into Eagle Mills salt. Typical Smackover Limestone was not encountered in these wells; a sequence of dark shales, dark impure limestones with minor amounts of sandstone had replaced the typical Smackover Limestone. This dark shale-dark limestone sequence is a counter-part to Lang's fore-reef deposit; the thin black shale laminae of the "banded limestone" of the Gulf-Werner well are interpreted as feather-edge deposits of the fore-reef type interfingering with reef-type deposits. The deposits of the reef-

zone are represented by the Smackover Limestone itself. Some cores of the Smackover Limestone, on the basis of lithology alone, would be mistakenly identified as Permian reef-limestone cores by West Texas geologists. The possible unconformity at the top of the Smackover Limestone in the Buckner field mentioned by Link (Link, Buckner Field) is interpreted by the writer as a local sedimentary break, a feature characteristic of reef-type deposits.

Due to the lack of information from deep wells drilled in the area to the north of present developments, Lang's back-reef type of deposits, the time equivalent of a portion of the Smackover Limestone, are not known. The Buckner formation probably represents a southward spreading tongue of these back-reef deposits.

The construction of south to north structural profiles across southern Arkansas results in some interesting conjectures. The abrupt termination of the Eagle Mills formation and of the Smackover Limestone cannot easily be interpreted as marking the original depositional boundaries of these formations. Rather, it is better interpreted as resulting from erosional truncation across southward dipping beds, which took place during a hiatus intervening between Buckner deposition and Cotton Valley deposition. Considering the lithologic character and thicknesses of the Eagle Mills formation and Smackover Limestone one may visualize that at one time these formations extended far to the north of the present buried boundaries and covered thousands of square miles in South Arkansas northward of the present known limits. As the writer visualizes the sequence of geological events, the shoreward equivalents of the Eagle Mills formation and the Smackover Limestone were stripped from the Carboniferous rocks, on which the Eagle Mills rests unconformably, during the Buckner-Cotton Valley hiatus.

The contrast in lithologic character of the reef and fore-reef deposits indicates that the fore-reef sediments may have come from an easterly or westerly direction but not from a northerly direction.

Mr. Paul Weaver has indicated to the writer his viewpoints on the age of the salt of the Isthmus of Tehuantepec, Mexico as quoted below:

"On the Tonolapa Salt Dome, located on the north side of the Isthmus of Tehuantepec near the town of Chinameca, state of Vera Cruz, Mexico, there are exposed on the surface Jurassic limestones of both Portlandian and Kimmeridgian ages. Wells which have been drilled through these limestones encountered anhydrite, thin salt, red shales then more salt.

The nearest outcrops of Jurassic, at a locality some 50 miles southeast of Chinameca near the boundary between the states of Vera Cruz, Tabasco and Chiapas, are limestones; the fauna of these limestones has not been studied sufficiently to know exactly how many stages of the Jurassic are represented. At this locality the limestones rest on the Todos Santos beds, made up of red sands, red shales and gravels which are non-fossiliferous so far as known. The age of the Todos Santos beds is conjectural but it is believed that they are continental beds of Jurassic age.

About 150 miles northwest of Chinameca, in the state of Oaxaca, the uppermost Jurassic is marine (in the El Consuelo section for example) and is underlain by plant bearing beds. The literature would suggest that these plant bearing beds rest directly on the

basement rocks in this region, but unpublished and unconfirmed reports of some credibility give a salt, gypsum and red shale sequence below the plant beds and above a thin marine Oxfordian. We therefore have a suggestion of Oxfordian or later age in the Jurassic for the salty series in Oaxaca, which would strengthen the argument that the salt in the Isthmus is probably Upper Jurassic.

Along the edge of the basement complex in southern Mexico, no marine beds older than Jurassic are known, until we see the "productus" limestone, supposedly definite Pennsylvanian in age, near Salina Cruz on the Pacific side of the Isthmus of Tehuantepec. The absence of exposures of any marine beds throughout a large area in southern Mexico, which might be referred to the Permian or Triassic, makes it very unlikely that the salt of the Isthmus can be Permian or Triassic in age, a consideration which furthers the viewpoint that the salt of the Isthmus is Jurassic probably as early as Oxfordian in age."

CONCLUSIONS

It is, of course, possible to assign a Permian age to the salt of South Arkansas, a viewpoint which would necessitate placing the Permian-Mesozoic contact at the top of the salt section or possibly within the basal portion of the Smackover Limestone, a procedure not at all illogical except for the fact that the few fossils reported from the basal portion of the Smackover Limestone are Mesozoic in character. Permian salt underlies a large area in West Texas; salt of Permian age also underlies parts of New Mexico, Oklahoma and Kansas. One might correlate the Eagle Mills Salt with the Permian Salt on the speculation that all great salt bodies in the southern part of the United States are Permian in age.

Schuchert and others have advocated a Lower Cretaceous age for the salt of South Arkansas and North Louisiana, a viewpoint which is consistent with all known facts.

On the other hand, Mr. Weaver has pointed out that the salt of the Isthmus of Tehuantepec underlies Jurassic limestones of Kimmeridgian age. He recently stated to the writer that the salt dome of Tonolapa is not a penetration dome of the type found in the Gulf Coastal area, with a salt core intrusive into overlying younger beds; but that it is the domal part of anticlinal fold, in which anticline the salt and the overlying Jurassic limestones have been folded accordantly.

Schuchert states that "It is a general belief of geologists that the Upper Jurassic of Mexico introduced a marine transgression that continued to deposit strata without break until in Upper Cretaceous time." (29; page 152).

It appears to the writer reasonable to place emphasis upon the viewpoint that the salt basin of the Isthmus of Tehuantepec and the salt basin of South Arkansas (and North Louisiana) are of one and the same age, connecting through the area now the site of the Gulf of Mexico; that the northern known tip of an Upper Jurassic salt basin terminates in Southern Arkansas, and a southwesterly indentation of the same basin, marks the site of the salt basin of the Isthmus of Tehuantepec.

The writer visualizes a major Upper Jurassic transgression across Louisiana into Arkansas, during which the Eagle Mills-Smackover Limestone-Buckner sequence

was laid down. No attempt has been made to define the eastern and western limits of the trough in which this northward transgression of the Upper Jurassic seas took place; probably the northeastern boundary cuts across central Mississippi and southwest Alabama and swings to the west of Cuba. The western boundary may approximate the trend of the Balcones Fault Zone through Texas and continue southward along the east coast of Northern Mexico.

If the writer's conception of the geological history is correct, the Upper Jurassic of North America must be considered as a major salt-forming epoch. This viewpoint is not inconsistent with the evidence afforded by the fossils from the upper part of the Smackover Limestone. Normal marine conditions did not exist while the Smackover reef-facies was being formed. The fauna of a reef-facies necessarily reflects to some degree its different environment, and without the evidence afforded by normal marine beds transitional into the reef-facies or into the fore-reef facies, a comparison of faunas of distant localities with that of a buried reef-facies is attended with difficulties of interpretation.

The Upper Jurassic periods of red bed deposition in Mexico (Oxfordian to Tithonian) synchronize with Upper Jurassic salt deposition in South Arkansas (and North Louisiana) and the Isthmus of Tehuantepec.

The marginal hiatus between the Buckner and Cotton Valley formations, as interpreted by the writer, is indication of an Upper Jurassic regression, followed by a Neocomian Cretaceous transgression.

During the past 12 years geological publications on the Lower Cretaceous of Northern Mexico, Texas, New Mexico and California have presented a wealth of information to readers. (Refer to Bibliography for the more easily obtainable publications in English). Correlation charts are an inevitable consequence of the dissemination of geological knowledge. There follows a chart showing a tentative correlation of the Trinity and pre-Trinity formations of the Ark-La-Tex area with formations of Northern Mexico.

TENTATIVE CORRELATION CHART - TRINITY AND OLDER MESOZOIC ROCKS OF THE ARK-LA-TEX. AREA & NORTHERN MEX.

EUROPE				ACATITA-LAS DELICIAS REGION (AFTER KELLY)	MOUNTAINS WEST OF LAGUNA DIST. (AFTER KELLUM)	SIERRA DE PARRAS WESTERN PART (AFTER IMLAY)	MIDDLE PART OF SIERRA DE PARRAS (AFTER IMLAY)	SOUTHWESTERN TEXAS (AFTER ADKINS & SCOTT) (MODIFIED)	NORTH LOUISIANA (HAZZARD & BLANDIED)	SOUTH ARKANSAS (HAZZARD & BLANDIED)	
	LOWER ALBIAN	HORIZON OF CLANSAYES		CUCHILLO FORMATION	AURORA LIMESTONE (LOWER PART)	AURORA LIMESTONE (LOWER PART)	AURORA LIMESTONE (LOWER PART)	GLEN ROSE	UPPER GLEN ROSE FM.	UPPER GLEN ROSE FM.	
		GARGASIAN			AURORA LIMESTONE (LOWER PART)	AURORA LIMESTONE (LOWER PART)	AURORA LIMESTONE (LOWER PART)		LOWER GLEN ROSE	LOWER GLEN ROSE	
	APTIAN	BEDOULIAN		LA PEÑA FORMATION	LA PEÑA FORMATION	LA PEÑA FORMATION	LA PEÑA FORMATION	UPPER CUCHILLO - PARAHOPOLITES ZONE OF SONNERATIA ①	LOWER GLEN ROSE	LOWER GLEN ROSE	
					LA PEÑA FORMATION	LA PEÑA FORMATION	LA PEÑA FORMATION		LOWER GLEN ROSE	LOWER GLEN ROSE	
	BERREMIAN	UPPER		HIATUS	PARRITAS FORMATION	LAS VIGAS FORMATION	CUPIDO LIMESTONE	LAS VIGAS FORMATION	LOWER GLEN ROSE	LOWER GLEN ROSE	
		LOWER			LAS VIGAS FORMATION	LAS VIGAS FORMATION	LAS VIGAS FORMATION		LOWER GLEN ROSE	LOWER GLEN ROSE	
	HAUTERIVIAN			RESTS ON PERMIAN	LAS VIGAS FORMATION	LAS VIGAS FORMATION	CUPIDO LIMESTONE	LAS VIGAS FORMATION	LOWER GLEN ROSE	LOWER GLEN ROSE	
					LAS VIGAS FORMATION	LAS VIGAS FORMATION	LAS VIGAS FORMATION		LOWER GLEN ROSE	LOWER GLEN ROSE	
	VALANGINIAN			TORCER FORMATION	TORCER FORMATION	TORCER FORMATION	TORCER FORMATION	TORCER FORMATION	COTTON VALLEY FORMATION	COTTON VALLEY FORMATION	
					TORCER FORMATION	TORCER FORMATION	TORCER FORMATION		COTTON VALLEY FORMATION	COTTON VALLEY FORMATION	
	BERRIASIAN			HIATUS	HIATUS	HIATUS	HIATUS	HIATUS	BUCKNER FM.	BUCKNER FM.	
					HIATUS	HIATUS	HIATUS		BUCKNER FM.	BUCKNER FM.	
	PORTLANDIAN	TITHONIAN or AQUILONIAN		LA CASITA FORMATION	LA CASITA FORMATION	LA CASITA FORMATION	LA CASITA FORMATION	LA CASITA FORMATION	SMACKOVER LS. (DARK SHALE FACIES)	SMACKOVER LS.	
		LOWER			LA CASITA FORMATION	LA CASITA FORMATION	LA CASITA FORMATION		LA CASITA FORMATION	SMACKOVER LS.	SMACKOVER LS.
	KIMMERIDGIAN			LA GLORIA FORMATION	LA GLORIA FORMATION	LA GLORIA FORMATION	LA GLORIA FORMATION	LA GLORIA FORMATION	EAGLE MILLS SALT	EAGLE MILLS	
					LA GLORIA FORMATION	LA GLORIA FORMATION	LA GLORIA FORMATION		LA GLORIA FORMATION	EAGLE MILLS SALT	EAGLE MILLS
	OXFORDIAN	UPPER		UPPER JURASSIC	UPPER	UPPER	UPPER	UPPER JURASSIC (?)	UPPER	UPPER	
		LOWER			LOWER	LOWER	LOWER		LOWER	LOWER	LOWER
LOWER CRETACEOUS				UPPER JURASSIC				JURASSIC (?)			

BIBLIOGRAPHY

- (1) Adkins, W. S. (1928) Handbook of Texas Cretaceous Fossils. Univ. Texas Bull. No. 2838.
- (2) _____ (1932) The Mesozoic Systems in Texas in The Geology of Texas Vol. 1, Part 2, Univ. Texas Bull. No. 3232.
- (3) Albritton, C. C., Jr. (1938) Stratigraphy and Structure of the Malone Mountains, Texas. Bull. G. S. A. Vol. 49, No. 12 - Part I.
- (4) Anderson, F. M. (1938) Lower Cretaceous Deposits in California and Oregon. G. S. A. Special Paper No. 16.
- (5) Böse, Emil (1923) Vestiges of an Ancient Continent in Northeast Mexico. Amer. Jour. Sci. Vol. 6.
- (6) _____ (1927) Cretaceous Ammonites from Texas and Northern Mexico. Univ. Texas Bull. No. 2748.
- (7) _____ and Cavins, O. A. (1927) The Cretaceous and Tertiary of Southern Texas and Northern Mexico. Univ. Texas Bull. No. 2748.
- (8) Cuyler, R. H. (1938) Travis Peak Formation of Central Texas. A. A. P. G. Convention, New Orleans, March, 1938.
- (9) Grage, V. P. and Warren, E. F., Jr. (1939) Lisbon Oil Field, Claiborne and Lincoln Parishes, Louisiana. A. A. P. G. Bull. Vol. 23, No. 3.
- (10) Hill, Robert T. (1893) Paleontology of the Cretaceous Formations of Texas and Invertebrate Paleontology of the Trinity Division. Proc. Biol. Soc. Wash. Vol. VIII.
- (11) _____ (1900) The Geology of the Black and Grand Prairies. U. S. G. S. 21st. Annual Report.
- (12) Imlay, R. W. (1936) Evolution of the Coahuila Peninsula, Mexico. Part IV. Geology of the Western Part of the Sierra de Parras. Bull. G. S. A. Vol. 47, No. 7.
- (13) _____ (1937) Geology of the Middle Part of the Sierra de Parras. Coahuila Mexico. Bull. G. S. A. Vol. 48, No. 5.
- (14) _____ (1938) Ammonites of the Taraises Formation of Northern Mexico. Bull. G. S. A. Vol. 49, No. 4.
- (15) _____ (1938) Studies of the Mexican Geosyncline. Bull. G. S. A. Vol. 49, No. 11.
- (16) _____ (1939) Upper Jurassic Ammonites from Mexico. Bull. G. S. A. Vol. 50, No. 1.

- (17) Jones, T. S. (1938) Geology of Sierra de la Peña, and Paleontology of the Indidura Formation. Bull. G. S. A. Vol. 49, No. 1.
- (18) Kellum L. B. (1932) Reconnaissance Studies in the Sierra de Jimulco, Mexico. Bull. G. S. A. Vol. 43, No. 3.
- (19) _____, Imlay, R. W. and Kane, U. G. (1936) Evolution of the Coahuila Peninsula, Mexico. Part I. Relation of Structure, Stratigraphy and Igneous Activity to an Early Continental Margin. Bull. G. S. A., Vol. 47, No. 7.
- (20) _____ (1936) Evolution of the Coahuila Peninsula, Mexico. Part III. Geology of the Mountains West of the Laguna District. Bull. G. S. A. Vol. 47, No. 7.
- (21) _____ (1936) Paleogeography of Parts of Border Province of Mexico, adjacent to West Texas. A. A. P. G. Bull. Vol. 20, No. 4.
- (22) _____ (1937) The Geology and Biology of the San Carlos Mountains, Tamaulipas, Mexico. Univ. Michigan Studies Sci. Ser. Vol. XII.
- (23) Kelly, W. A. (1936) Evolution of the Coahuila Peninsula, Mexico. Part II. Geology of the Mountains bordering the Valleys of Acatita and Las Delicias. Bull. G. S. A. Vol. 47, No. 7.
- (24) Lasky, S. G. (1938) Newly Discovered Section of Trinity Age in Southwestern New Mexico. A. A. P. G. Bull. Vol. 22, No. 5.
- (25) Lang, W. B. (1937) The Permian Formations of the Pecos Valley of New Mexico and Texas. A. A. P. G. Bull. Vol. 21, No. 7.
- (26) Muir, J. M. (1936) Geology of the Tampico Region, Mexico. A. A. P. G. Publication.
- (27) Ordóñez, Ezequiel (1936) Principal Physiographic Provinces of Mexico. A. A. P. G. Bull. Vol. 20, No. 10.
- (28) Santillan, Manuel (1936) Synopsis of the Geology of Mexico. A. A. P. G. Vol. 20, No. 4.
- (29) Schuchert, Charles (1935) Historical Geology of the Antillean Caribbean Region.
- (30) Stanton, T. W. (1928) Lower Cretaceous or Comanche Series. Amer. Jour. Sci. Vol. XVI, 5th. Ser. No. 95.
- (31) Weeks, W. B. (1938) South Arkansas Stratigraphy with Emphasis on the Older Coastal Plain Beds. A. A. P. G. Bull. Vol. 22, No. 8.

BIBLIOGRAPHY

The following Bibliography of one hundred and ninety two publications relating to the geology of the Ark-La-Tex area has been prepared by Mr. B. W. Blanpied:

- Adkins, W. S. Handbook of Cretaceous fossils. Texas Univ. Bull. No. 2838. (1928).
- Adkins, W. S. Upper Cretaceous unconformities in Texas. Texas Univ. Bull. No. 3501, pp. 141-149. (1935).
- Alexander, C. I. Ostracoda of the Cretaceous of North Texas. Texas Univ. Bull. No. 2907. (1929).
- Arkansas Board of Conservation. Petroleum Development in Arkansas 1937-1938. El Dorado, Ark. Jan. 1, 1939.
- Arkansas Diamond Company. Diamonds in Arkansas, a brief account of the discovery and investigation and official reports by H. S. Washington and John T. Fuller, on the occurrence of diamonds in Pike Co., Ark. 38 pp. Little Rock. (1908).
- Barrett, W. M. Magnetometer study of the Caddo-Shreveport uplift, Louisiana. A. A. P. G. Bull. Vol. 14, No. 2. (1930).
- Bates, Mowry. A concrete example of the use of well logs. (Red River-Crichton oil field, Louisiana). Am. I. M. Eng. Bull. 137, pp. 979-986. (1918).
- Bates, Mowry. The oil and gas fields of Northern Louisiana. A. A. P. G. Bull. Vol. 2. (1918).
- Bell, H. W. and Kerr, J. B. The El Dorado, Arkansas, Oil and Gas Field. U. S. Bur. of Mines and Ark. Bur. of Mines. (1922).
- Bell, H. W. Subsurface conditions in the heavy-oil producing area of Smackover, Arkansas. A. A. P. G. Bull. Vol. 7, No. 6. (1923).
- Bell, H. W., Haury, P. S. and Kelly, R. B. Preliminary report on the eastern part of the Smackover, Arkansas, oil and gas field. Ark. Bur. of Mines, Little Rock. (1923).
- Bell, H. W. The Monroe Gas Field. La. Dept. of Conservation, Bull. No. 12. (1926).
- Bell, H. W. Discovery of Rock Salt deposit in deep well in Union County. Ark. Geol. Survey. Info Circular 5. (1933).
- Bramlette, M. N. Bentonite in the Upper Cretaceous of Louisiana. A. A. P. G. Bull. Vol. 8, No. 3. (1924).
- Bramlette, M. N. Volcanic rocks in the Cretaceous of Louisiana. A. A. P. G. Bull. Vol. 8, No. 3. (1924).
- Branner, Geo. C. Outlines of Arkansas' Mineral resources. Ark. Bur. of Mines, Manuf., and Agr. and Ark. Geol. Survey, Little Rock. (1927).

- Branner, John C. and Brackett, R. N. The Peridotite of Pike Co., Arkansas. Am. Jour. Sc. No. 3, Vol. 38, pp. 50-59. (1889). Abstract, Mem. Am. Assn. for the Adv. of Sci., Proc. Vol. 37, pp. 188-89. (1889).
- Branner, John C. The former extension of the Appalachian across Mississippi, Louisiana and Texas. Am. Jour. Sci. 4th. Series Vol. 4. (1897).
- Branner, John C. The Cement Materials of Southwest Arkansas. Am. I. M. Eng. Trans. Bull. 27; pp. 42-63, 944-46. (1898).
- Branner, John C. Some facts and correlations regarding the diamond region of Arkansas. Eng. & Min. Jour. Vol. 87, pp. 371-72. (1909).
- Branner, John C. Oil and Gas Geology, Outlines of Arkansas Geology. pp. 15-20. Ark. Bur. of Mines, Manuf., and Agri. Little Rock. (1920).
- Campbell, Ian and Miller, A. D. Nepheline basalt in Richland Parish Gas Field, Louisiana. A. A. P. G. Bull. Vol. 12, No. 10. (1928).
- Carsey, Dorothy O. Foraminifera of the Cretaceous of Central Texas. Texas Univ. Bull. No. 2612. (1926).
- Clark, C. C. Sugar Creek Field, Claiborne Parish, Louisiana. A. A. P. G. Bull. Vol. 22, No. 11. (1938).
- Crider, A. F. The El Dorado, Arkansas, Oil and Gas Field and its relation to north Louisiana structures. A. A. P. G. Bull. Vol. 6, No. 3. (1922).
- Crider, A. F. Relation of Upper Cretaceous to Eocene structures in Louisiana and Arkansas. A. A. P. G. Bull. Vol. 7, No. 4. (1923).
- Crider, A. F. Volcanic ash in northern Louisiana. A. A. P. G. Bull. Vol. 8, No. 4. (1924).
- Crider, A. F. Deep Pine Island Gas, northern Louisiana. A. A. P. G. Bull. Vol. 9, No. 1. (1925).
- Crider, A. F. Pine Island deep sands, Caddo Parish, Louisiana. Str. Typical Am. Oil Fields. Vol. 2. A. A. P. G. (1929).
- Crider, A. F. Bellevue Oil Field, Bossier Par., Louisiana. A. A. P. G. Bull. Vol. 22, No. 12. (1938).
- Croneis, Carey. Geology of the Arkansas Paleozoic Area. Ark. Geol. Survey. Bul. 3. (1930).
- Dane, Carle H. Oil-bearing formations of southwestern Arkansas. U. S. G. S. Press notice 8823 (Sept. 10, 1926).
- Dane, Carle H. and Stephenson, L. W. Notes on the Taylor and Navarro formations in east central Texas. A. A. P. G. Bull. Vol. 12, No. 1. (1928).
- Dane, Carle H. Upper Cretaceous Formations of Southwestern Arkansas. Ark. Geol. Survey Bull. 1. (1929).

- Drake, N. F. Petroleum and Natural Gas in Arkansas. Ark. Bur. of Mines, Manuf., and Agr. (1922).
- Dumble, E. T. The Geology of East Texas, Texas Univ. Bull. No. 1869. (1920).
- Eberle, Peter, The Arkansas diamond fields. Mining World, Vol. 31, pp. 285-86. (1909).
- Eckel, E. C. Portland cement materials and industries in the United States. U. S. G. S. Bull. 522. (1913).
- Ellison, Alva C. The age and correlation of the chalk at White Cliffs, Arkansas, with notes on the subsurface correlations of northeast Texas. A. A. P. G. Bull. Vol. 9, No. 8. (1925).
- Ellison, Alva C. and Teagle, John. Correlation of Pecan Gap Chalk in Texas. A. A. P. G. Bull. Vol. 18, No. 11. (1934).
- Fergus, Preston. Monroe Gas Field, La. Geol. of Nat. Gas, A. A. P. G. (1935).
- Fletcher, C. D. Structure of Caddo Field, Caddo Parish, La. A. A. P. G. Structure of Typical Am. Oil Fields; Vol. 11. (1929).
- Fuller, John T. Diamond Mine in Pike Co., Arkansas. Eng. & Min. Jour. Vol. 87 pp. 152-55. (1909).
- Gilluby, James and Heald, K. C. Stratigraphy of the El Dorado oil field, Arkansas as determined by drill cuttings. U. S. G. S. Bull. 736. (1923).
- Glenn, Leonidas C. The Arkansas diamond-bearing peridotite area. (Abstract). Science N. S. Vol. 35, pp. 312. (1912), (with discussion by A. H. Purdue), Geol. Soc. Am. Bull. 23, pp. 726. (1912).
- Gordon, C. H. Geology and underground waters of northeastern Texas. U. S. G. S., W. S. P. 276. (1918).
- Gordon, Dugald. Glen Rose gas production in northeast Texas. A. A. P. G. Bull. Vol. 14, No. 11. (1930).
- Gordon, Dugald. Richland Gas Field, Louisiana. Geol. of Nat. Gas. A. A. P. G. (1935).
- Grage, V. P. and Warren, E. F. Jr. Lisbon Oil Field, Claiborne and Lincoln Parishes, Louisiana. A. A. P. G. Bull. Vol. 23, No. 3. (1939).
- Grimm, M. W. and Howe, H. V. New Waskom Gas Field of Louisiana and Texas. Pan-Am. Geol. Vol. 43, No. 5. (1925).
- Grimm, M. W. Shreveport Field, Caddo Parish, Louisiana. A. A. P. G. Bull. Vol. 22, No. 9. (1938).
- Hager, Dilworth S. The northeast Texas fault line. (Abstract). A. A. P. G. Vol. 20, No. 11. (1936).

- Hamill, C. A. The Cretaceous of northwestern Louisiana. A. A. P. G. Bull. Vol. 5, No. 2. (1921).
- Harris, Gilbert D. The Tertiary geology of southern Arkansas. Ark. Geol. Sur. Ann. Rep. for 1892. (1894).
- Harris, Gilbert D. The geology of the Mississippi embayment with special reference to the State of Louisiana. La. Geol. Survey, Part 6. (1902).
- Harris, Gilbert D. Magnetic rocks (peridotite eruptives about Murfreesboro, Ark.) Sci. new series 29, pp. 384. (1909).
- Harris, C. D. Oil and gas in Louisiana. U. S. G. S. Bull. 429. (1910).
- Haury, P. S., Bell, H. W. and Kelly, R. B. Engineering Report on the Smackover Oil and Gas field, Ouachita and Union Counties, Arkansas. U. S. Bur. Mines and Chamber of Commerce El Dorado. (1924).
- Hayes, Charles Willard. The Asphalt Deposits of Pike Co., Arkansas. Eng. & Ming. Jour. Vol. 74, p. 782. (1902).
- Hayes, Charles Willard. Asphalt deposits of Pike Co., Arkansas. U. S. G. S. Bull. 213, pp. 353-55. (1903).
- Heald, K. C. and Rubey, W. W. El Dorado Oil field in Arkansas not on an anticline. A. A. P. G. Bull. Vol. 6, No. 4. (1922).
- Hill, Robert T. The topography and geology of the Cross Timbers and surrounding regions in Northern Texas. Am. Jour. Sci., 3rd. Series, Vol. 33, No. 196. (1887).
- Hill, Robt. T. Neozoic geology of southwestern Arkansas. Ark. Geol. Survey. Ann. Rept. Vol. 2, Part 1, Little Rock. (1888).
- Hill, Robert T. The Trinity formation of Arkansas, Indian Territory, and Texas. Science No. 11. (1888).
- Hill Robert T. and Penrose, R. A. F., Jr. Relation of the uppermost Cretaceous beds of the eastern and southern United States; and the Tertiary-Cretaceous parting of Arkansas and Texas. Am. Jour. Sci; 3rd. Series. Vol. 38. (1889).
- Hill, Robert T. A preliminary annotated check list of the Cretaceous invertebrate fossils of Texas, accompanied by a short description of the lithology and stratigraphy of the system. Texas Geol. Survey. Bull. 4, XXXI. (1889).
- Hill, Robert T. Paleontology of the Cretaceous formations of Texas, Part I. Tex. Univ. Sch. Geol. Austin. (1889).
- Hill, Robert T. Events in North American Cretaceous history illustrated in the Arkansas-Texas division of the Southwestern region of the United States. Am. Jour. Sci. 3rd. Series. Vol. 37. (1889).
- Hill, Robert T. A brief description of the Cretaceous rocks of Texas and their economic value. Texas Geol. Survey. Ann. Rept. 1. (1890).

- Hill, Robert T. The fossils of the Trinity beds. Am. Geol. No. 5. (1890).
- Hill, Robert T. The Texas Cretaceous. Am. Geol. No. 6. (1890).
- Hill, Robert T. The Comanche series of the Texas-Arkansas region (with discussion by C. A. White and others). Geol. Soc. Am. Bull. 2. (1891).
- Hill, Robert T. Paleontology of the Cretaceous formations of Texas; the invertebrate paleontology of the Trinity division. Biol. Soc. Wash. Proc. No. 8. (1893).
- Hill, Robert T. Geology of parts of Texas, Indian Territory and Arkansas adjacent to Red River region. Geol. Soc. Am. Bull. 5. (1894). Abstract Am. Geol. No. 13. (1894). Am. Jour. Sci. 3rd. Series. (1894).
- Hill, Robert T. The Texas Section of the American Cretaceous. Am. Jour. Sci. 3rd. Series. Vol. 34. (1897).
- Hill, Robert T. and Vaughan, T. W. The Lower Cretaceous Gryphaeas of the Texas region. U. S. G. S. Bull. 151. (1898).
- Hill, Robert T. Geography and Geology of the Black and Grand Prairies, Texas. U. S. G. S., An. Rept. No. 21. Part 7. (1901).
- Hill, Robert T. The chalk formations of Northeast Texas. Science New Series. 29. (1909).
- Hill, Robert T. The Trinity of Texas. A. A. P. G. Bull. Vol. 13, No. 5. (1929).
- Holman, E. and Campbell, R. B. The Bellevue Oil Field, Louisiana. A. A. P. G. Bull. Vol. 7, No. 6. (1923).
- Holston, A. A. Discovery of oil in Bodcaw Sand, Cotton Valley Field, Webster Parish, Louisiana. A. A. P. G. Bull. Vol. 22, No. 11. (1938).
- Honess, C. W. Geology of southern Ouachita Mountains of Oklahoma. Okla. Geol. Survey, Bull. 32, Part 1. (1923).
- Honess, C. W. Geology of Atoka, Pushmataha, McCurtain, Bryan and Choctaw Counties, Oklahoma. Okla. Geol. Survey. Bull. 40-R. (1927).
- Hopper, W. E. The Caddo Oil and Gas Field, Louisiana. Am. I. M. Eng. Bull. 52, pp. 283-309. (1911). Trans. 42, pp. 409-435. (1912).
- Howe, H. V. The Arkadelphia formation; Historical Summary. La. State Univ., Univ. Bull. New Series, Vol. 16, No. 5. (1924).
- Howe, H. V. The Arkadelphia formation, stratigraphy. La. State Univ., Univ. Bull, New Series, Vol. 16, No. 5. (1924).
- Howe, H. V. The Nacatoch formation. La. State Univ., Univ. Bull., New Series, Vol. 16, No. 5. (1924).
- Hull, J. P. D. and Spooner, W. C. A review of oil and gas pools in north Louisiana territory. A. A. P. G. Bull. Vol. 6, No. 3. (1922).

- Hull, J. P. D. El Dorado oil field in Arkansas not on an anticline. A. A. P. G. Bull. Vol. 6, No. 5. (1922).
- Hull, J. P. D. Wildcat wells in south central Arkansas stop short of deep oil sand. A. A. P. G. Bull. Vol. 6, No. 5. (1922).
- Hull, J. P. D. Notes in the stratigraphy of producing sands in northern Louisiana and southern Arkansas. A. A. P. G. Bull. Vol. 7, No. 4. (1923).
- Hull, J. P. D. Guide notes on the Midway in Southwestern Arkansas. A. A. P. G. Bull. Vol. 9, No. 1. (1925).
- Hull, J. P. D. Plans for compilation of Louisiana-Arkansas Geology. A. A. P. G. Bull. Vol. 8, No. 3. (1926).
- Huntley, L. G. The Sabine Uplift (Arkansas-Louisiana). A. A. P. G. Bull. Vol. 7, No. 2. (1923).
- Israelsky, Merle C. Correlation of the Brownstown (restricted) formation of Arkansas. A. A. P. G. Bull. Vol. 13, No. 6. (1929).
- Israelsky, Merle C. Upper Cretaceous Ostracoda of Arkansas. Ark. Geol. Survey Part of Bull. 2. (1929).
- Ivy, John S. The Rodessa Field. Oil & Gas Journal. Vol. 34, No. 48, April 16, 1936.
- Kamb, H. R. Classification of Zwolle Field, Louisiana, as limestone reservoir. A. A. P. G. Bull. Vol. 15, No. 10. (1931).
- Kurz, Geo. Frederick, and Washington, H. S. Notes on the forms of Arkansas diamonds. Am. Jour. Sci. No. 4. Vol. 24. pp. 275-76. (1907).
- Kurz, Geo. Frederick, and Washington, H. S. Occurrence of diamonds in Arkansas. U. S. G. S. Min. Res. 1906, pp. 1247-1251. (1907).
- Kurz, Geo. Frederick, and Washington, H. S. Diamonds in Arkansas. Am. I. M. Eng. Bull. 20, pp. 187-194. (1908). Am. I. M. Eng. Trans. 39, pp. 169-176 (1909); Mines & Minerals Vol. 28. pp. 552-53 (1908); Mining World Vol. 28, pp. 443 (1908).
- Liddle, R. A. The Van Oil Field, Van Zandt County, Texas. U. of Texas Bull. No. 3601. (1936).
- McCourt, Walter E. Diamonds in Arkansas. Acad. Sci. of St. Louis. Trans. 18, pp. lix - lx (1910); (Abstract) Science, N. S. Vol. 30, p. 127. (1909).
- McDonald, W. W. Cotton Valley Oil Field, Webster Parish, Louisiana. A. A. P. G. Bull. Vol. 9, No. 5. (1925).
- Matson, G. C. The Caddo Oil and Gas Field, Louisiana and Texas. U. S. G. S. Bull. 619. (1916).
- Matson, G. C. and Hopkins, O. B. The De Soto-Red River Oil and Gas Field, Louisiana, U. S. G. S. Bull. 661. (1917). Abstract, by R. W. Stone, Wash. Acad. Sci. Journal 8, pp. 35-36. (1918).

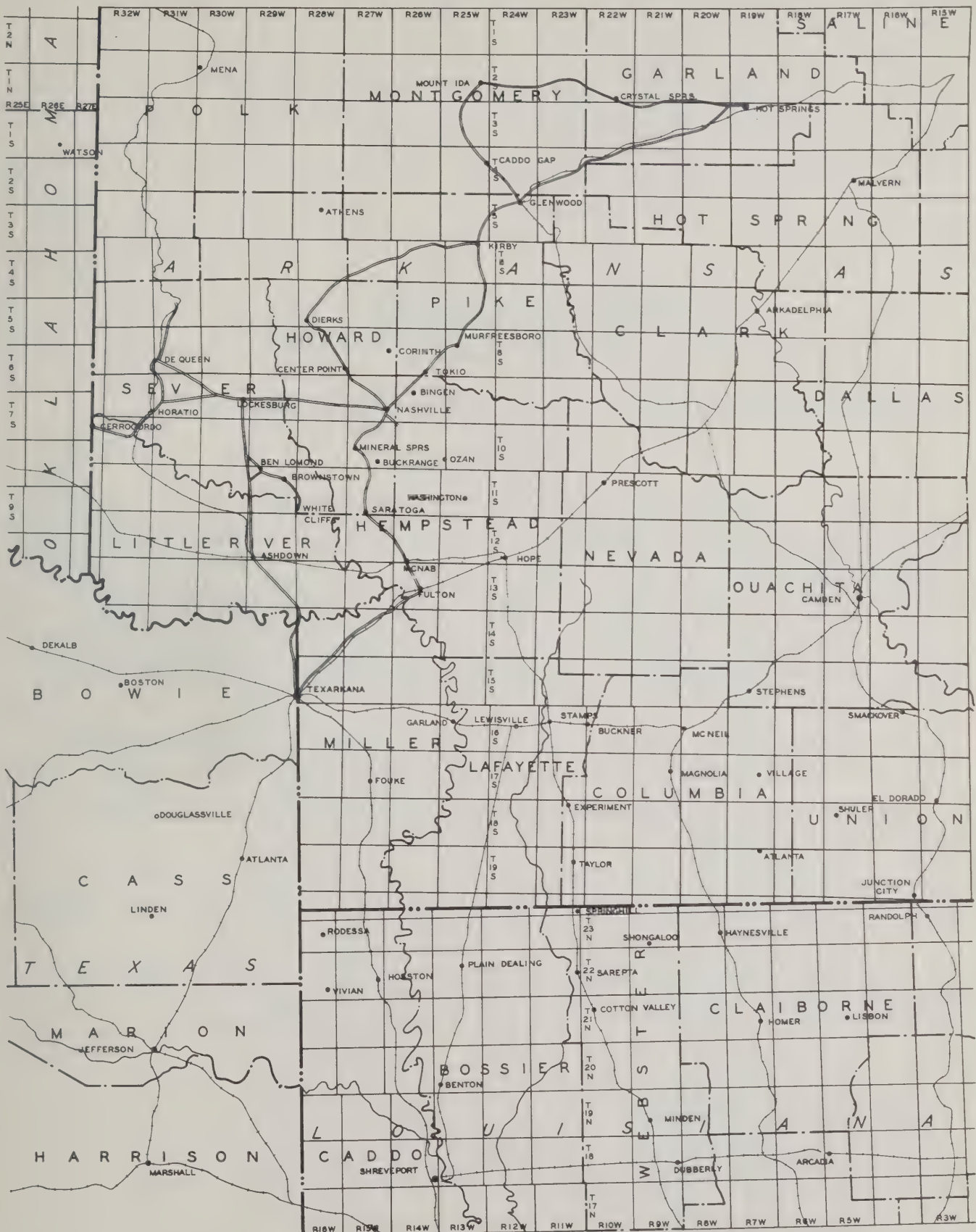
- Melton, F. A., and McGuigan, F. H. The depth of the base of the Trinity Sandstone and the present attitude of the Jurassic peneplain in southern Oklahoma, and southwestern Arkansas. A. A. P. G. Bull. Vol. 12, No. 10. (1928).
- Minor, H. E. and Hanna, M. A. East Texas Oil Field. A. A. P. G. Bull. Vol. 17, No. 7. (1933).
- Miser, Hugh D. New areas of diamond-bearing peridotite in Arkansas. U. S. G. S. Bull. 540, pp. 534-46. (1914).
- Miser, Hugh D. and Purdue, A. H. Gravel deposits of the Caddo Gap and De Queen Quadrangles, Arkansas. U. S. G. S. Bull. 690, pp. 15-29. (1918). (Abstract). Wash. Acad. Sci. Jour. Vol. 8. pp. 538. (1918).
- Miser, Hugh D. and Purdue, A. H. Asphalt Deposits and oil conditions in Southwestern Arkansas. U. S. G. S. Bull. 691. pp. 271-92. (1918).
- Miser, H. D. Llanoria, the Paleozoic land area in Louisiana and eastern Texas. Am. Jour. Sci. 5th. Ser. Vol. 2. pp. 61-89. (1921).
- Miser, H. D. and Ferguson, J. G. Geology and topographic features of Arkansas; minerals of Arkansas. Ark. Bur. of Mines. Manuf., & Agr., Little Rock. (1922).
- Miser, H. D. and Ross, C. S. Diamond-bearing peridotite in Pike County, Arkansas. Econ. Geol. Vol. 17, No. 8. (1922).
- Miser, H. D. and Ross, C. S. Diamond-bearing peridotite in Pike County, Arkansas. U. S. G. S. Bull. 735. (1923).
- Miser, H. D. and Ross, C. S. Volcanic rocks in the Upper Cretaceous of Southwestern Arkansas and Southeastern Oklahoma. Am. Jour. Sci. 5th. Ser. Vol. 9, No. 2. pp. 113-126. (1925).
- Miser, H. D. Lower Cretaceous (Comanche) rocks of southeastern Oklahoma and southwestern Arkansas. A. A. P. G. Bull. Vol. 11, No. 5. (1927).
- Miser, H. D. Structure of the Ouachita Mountains of Oklahoma and Arkansas. Okla. Geol. Survey Bull. No. 50. (1929).
- Miser, H. D. and Purdue, A. H. Geology of the De Queen and Caddo Gap Quadrangles, Arkansas. U. S. G. S. Bull. 808. (1929).
- Miser, H. D. Paleozoic rocks in wells in Gulf Coastal Plain South of Ouachita Mountains (Abstract). Pan-Am. Geol. Vol. 53, No. 3. (1930).
- Miser, H. D. and Sellards, E. H. Pre-Cretaceous rocks found in wells in Gulf Coastal Plain south of Ouachita Mountains. A. A. P. G. Bull. Vol. 15, No. 7. (1931).
- Miser, H. D. Relation of Ouachita belt of Paleozoic rocks to oil and gas fields of Mid-Continent region. A. A. P. G. Bull. Vol. 18, No. 8. (1934). Abstract, Pan-American Geol. Vol. 59, No. 3. pp. 227-28, April, 1933.
- Moody, C. L. Tertiary history of region of Sabine Uplift, Louisiana.

- A. A. P. G. Bull. Vol. 15, No. 5. (1931).
- Moody, C. L. Oil and gas geology of the Gulf Coastal Plain in Arkansas, by W. C. Spooner (A Review). A. A. P. G. Bull. Vol. 19, No. 4. (1935).
- Moreman, W. L. Micrology of the Woodbine, Eagle Ford, and Austin Chalk. Texas Univ. Bull. No. 2544. (1925).
- Moreman, W. L. Fossil Zones of the Eagle Ford of North Texas. Jour. Paleo. Vol. 1, No. 1. (1927).
- Norton, E. G. The origin of Louisiana and East Texas salines (with discussion by E. D. Harris). Am. I. M. Eng. Bull. No. 97, (1915); Trans. Vol. 51. (1916).
- Olcott, Perry. Talco, a new oil field in northeastern Texas. Mining & Met. Vol. 17, No. 359, pp. 519-20. Nov. 1936.
- Plummer, F. B. and Sargent, E. C. Woodbine sand of northeast Texas. Texas. Univ. Bull. 3138. (1931).
- Ponton, G. M. and Whitehurst, J. W. The Spring Hill-Sarepta Gas Field, Webster and Bossier Parishes, Louisiana. A. A. P. G. Bull. Vol. 7, No. 5. (1923).
- Powers, Sidney. The Sabine Uplift. A. A. P. G. Bull. Vol. 4, No. 2. (1920).
- Powers, Sidney. El Dorado oil and gas field. A. A. P. G. Bull. Vol. 6, No. 6. (1922).
- Powers, Sidney. Cotton Valley Oil and Gas Field, Webster Parish, Louisiana. A. A. P. G. Bull. Vol. 8, No. 2. (1924).
- Pratt, W. E. The recent discovery at El Dorado, Arkansas. A. A. P. G. Bull. Vol. 5, No. 1. (1921).
- Rankin, C. L. Faulting in Southwestern Arkansas. A. A. P. G. Bull. Vol. 14, No. 7. (1930).
- Ralston, Wallace. Development and production, East Texas district. A. A. P. G. Bull. Vol. 20, No. 7. (1936).
- Ross, C. S., Miser, H. D. and Stephenson, L. W. Water-laid volcanic rocks of early Upper Cretaceous Age in southwestern Arkansas, southeastern Oklahoma, and northeastern Texas. U. S. G. S. Prof. Paper 154-F. (1929).
- Ross, J. S. Deep sand development in Cotton Valley field, Webster Parish, Louisiana. A. A. P. G. Bull. Vol. 14, No. 8. (1930).
- Ross, J. S. Engineering report of Cotton Valley Field, Webster Parish, Louisiana. U. S. Bureau of Mines, Tech - Paper 504. (1931).
- Rubey, W. W. Wildcat exploration in south central Arkansas. A. A. P. G. Bull. Vol. 6, No. 4. (1922).

- Schneider, H. G. Smackover oil field, Ouachita and Union Counties, Arkansas. Am. Inst. Min. & Met. Eng. Trans. Vol. 70, pp. 1076-1099. (1924).
- Schneider, H. G. Names of producing sands in the Smackover, Arkansas field. A. A. P. G. Bull. Vol. 9, No. 7. (1925).
- Schneider, Philip F. A preliminary report on the Arkansas diamond field. Ark. Bur. of Mines. (1907).
- Schneider, Philip F. Geology and Mining in Arkansas diamond field (Abstract). Mining World Vol. 28, pp. 255-57. (1908).
- Scott, Gayle. On a new correlation of the Texas Cretaceous. Am. Jour. Sci. 5th. Series. Vol. 12. (1926).
- Scott, Gayle. The Woodbine sand of Texas interpreted as a regressive phenomenon. A. A. P. G. Bull. Vol. 10, No. 6. (1926).
- Scott, W. W. Preliminary report on the underground conditions in the Haynesville Oil Field, Louisiana. A. A. P. G. Bull. Vol. 6, No. 2. (1922).
- Scott, W. W. and Stroud, B. K. The Haynesville Oil Field, Claiborne Parish, Louisiana. La. Dept. of Conservation Bull. No. 11. (1922).
- Sellards, E. H., Adkins, W. S. and Plummer, F. B. Geology of Texas, Stratigraphy. Texas Univ. Bull. No. 3232 Vol. 1. (1932).
- Sellards, E. H. and Baker, C. L. The Geology of Texas, Structural and Economic Geology. Texas Univ. Bull. 3401, Vol. II. (1934).
- Shearer, H. K. and Hutson, E. B. Dixie Oil Pool, Caddo Parish, Louisiana. A. A. P. G. Bull. Vol. 14, No. 6. (1930). Abstract, Pan. Am. Geol. Vol. 53, No. 3. (1930).
- Shearer, H. K. Developments in South Arkansas and North Louisiana in 1937. A. A. P. G. Bull. Vol. 22, No. 6. (1938).
- Sohlberg, R. G. Cinnabar and associated minerals from Pike Co. Ark. Am. Mineralogist, Vol. 18, No. 1. (1933).
- Sohlberg, R. G. Petrographic study of quick silver ores and associated minerals from Pike Co, Arkansas. (Abstract). Geol. Soc. Amer. Bull. Vol. 44, Part 1, pp. 158-59. (1933).
- Spofford, H. N. Pecan Gap Chalk, new localities in Red River and Bowie Counties, Texas. A. A. P. G. Bull. Vol. 16, No. 2. (1932).
- Spooner, W. C. The Monroe Gas Field; Geology. La. Dept. of Conservation Bull. No. 12. (1926).
- Spooner, W. C. Production in East Carroll Parish, La. A. A. P. G. Bull. Vol. 12, No. 7. (1928).
- Spooner, W. C. Rainbow City field, Union County, Arkansas. A. A. P. G. Bull. Vol. 12, No. 7. (1928).

- Spooner, W. C. Homer Oil Field, Claiborne Parish, La. Structure of Typical Am. Oil Fields, Vol. 1. A. A. P. G. (1929).
- Spooner, W. C. Stephens Oil Field, Columbia and Ouachita Counties, Arkansas. Str. Typical Am. Oil Fields, Vol. 2. A. A. P. G. (1929).
- Spooner, W. C. Salt in Smackover Field, Union County, Arkansas. A. A. P. G. Bull. Vol. 16, No. 6. (1932).
- Spooner, W. C. Oil and Gas Geology of the Coastal Plain in Arkansas. Published in cooperation with Ark. Geol. Survey. Bull. 2. (1935).
- Stephenson, L. W. Species of *Exogyra* from the eastern Gulf Region and the Carolinas. U. S. G. S. Prof. Paper 81. (1914).
- Stephenson, L. W. The Cretaceous-Eocene contact in the Atlantic and Gulf Coastal Plain. U. S. G. S. Prof. Paper 90. (1915).
- Stephenson, L. W. A contribution to the geology of northeastern Texas and southern Oklahoma. U. S. G. S. Prof. Paper 120. (1918).
- Stephenson, L. W. Notes on the stratigraphy of the Upper Cretaceous formations of Texas and Arkansas. A. A. P. G. Bull. Vol. 11, No. 1. (1927), and note of correction, No. 3. (1927).
- Stephenson, L. W. Major Marine Transgressions and Regressions and structural features of the Gulf Coastal Plain. Am. Jour. Sci. 5th. Series. Vol. 16. (1928).
- Stephenson, L. W. Age of Brownstown marl of Arkansas. A. A. P. G. Bull. Vol. 13, No. 8. (1929).
- Stephenson, L. W. Unconformities in Upper Cretaceous series in Texas. A. A. P. G. Bull. Vol. 13, No. 10. (1929).
- Stephenson, L. W. Stratigraphic Relations of the Austin, Taylor and equivalent formations in Texas. U. S. G. S. Prof. Paper 186-G. (1937).
- Stephenson, L. W. and Reeside, John B., Jr. Comparison of Upper Cretaceous Deposits of Gulf Region and Western Interior Region. A. A. P. G. Bull. Vol. 22, No. 12. (1938).
- Taff, Joseph A. Chalk of southwestern Arkansas. U. S. G. S. An. Rep. No. 22, part 3, pp. 687-742. (1902).
- Teas, L. P. Haynesville Field, Louisiana. A. A. P. G. Bull. Vol. 6, No. 1. (1922).
- Teas, L. P. The Haynesville, Louisiana (Oil) Field. A. A. P. G. Bull. Vol. 6, No. 4. (1922).
- Teas, L. P. New Producing depths at El Dorado, Arkansas. A. A. P. G. Bull. Vol. 6, No. 5. (1922).
- Teas, L. P. Bellevue Oil Field, Bossier Parish, Louisiana. Str. Typical Am. Oil fields Vol. 1. A. A. P. G. (1929).

- Teas, L. P. Irma oil field, Nevada County, Arkansas. Str. Typical Am. oil fields, Vol. 1, A. A. P. G. (1929).
- Thomas, G. D. Carterville-Sarepta and Shongaloo Fields, Bossier and Webster Parishes, Louisiana. A. A. P. G. Bull. Vol. 22, No. 11.(1938).
- Thomas, N. L. and Rice, E. M. Cretaceous chalks, Texas and Arkansas. A. A. P. G. Bull. Vol. 15, No. 8. (1931).
- Thomas, N. L. and Rice, E. M. Notes on the Saratoga Chalk. Jour. Paleontology. Vol. 5, No. 4. (1931).
- Thomas, N. L. Notes on the Annona Chalk. Jour. Paleo. Vol. 6, No. 4. (1932).
- Thomas, N. L. East Texas Chalks (Abstract). Geol. Soc. Am. Proc. 1933, p. 113. (1934).
- Thomas, N. L. East Texas correlations (Abstract). Geol. Soc. Am. Proc. 1934, pp. 117-118, June, 1935.
- Thompson, Sheridan A. Fredericksburg Group of Lower Cretaceous with special reference to north-central Texas. A. A. P. G. Bull. Vol. 19, No. 10. (1935).
- Vanderpool, H. C. Fossils from the Trinity Group (Lower Comanchean). Jour. Paleo. Vol. 2, No. 2. (1928).
- Vanderpool, H. C. A preliminary study of the Trinity Group in southwestern Arkansas, southeastern Oklahoma and northern Texas. A. A. P. G. Bull. Vol. 12, No. 11. (1928).
- Veach, A. C. Geology and underground water resources of northern Louisiana and southern Arkansas. U. S. G. S. Prof. Paper 46. (1906).
- Weeks, Warren B. South Arkansas Stratigraphy with emphasis on the older Coastal Plain Beds. A. A. P. G. Bull. Vol. 22, No. 8. (1938).
- Wendlandt, E. A. Talco field, Titus and Franklin Counties, Texas. A. A. P. G. Bull. Vol. 20, No. 7. (1936).
- White, C. A. On Certain Cretaceous fossils from Arkansas and Colorado. U. S. Nat. Mus. Proc. Vol. 4, pp. 136-139. (1892).
- Williams, J. F. The igneous rocks of Arkansas. Ark. Geol. Survey. Ann. Rpt. for 1890, Vol. 2. (1891).
- Zavoico, Basil B. Geology of economic significance of East Texas (oil field). World Petroleum, Vol. 7, No. 3, March, 1936.



INDEX MAP
ARK. LA. TEX. AREA

SHREVEPORT GEOLOGICAL SOCIETY
FOURTEENTH ANNUAL FIELD TRIP
JUNE 2ND., 3RD., & 4TH., 1939
ROUTE MAPS AND STOPS

BY

R. T. HAZZARD, B. W. BLANPIED, J. D. MOODY AND J. T. MCGLOTHLIN

INTRODUCTION

Principal sources of information used in compiling the Route Maps were C. H. Dane's "Upper Cretaceous Formations of Southwestern Arkansas" (Arkansas Geological Survey Bulletin No. 1); Miser and Purdue's "Geology of the De Queen and Caddo Gap Quadrangles, Arkansas" (U. S. G. S. Bulletin No. 808); and "Oil and Gas Geology of the Gulf Coastal Plain in Arkansas" by W. C. Spooner (Ark. Geol. Survey Bull. No. 2). The information supplied by these publications was augmented by plane table surveys of C. I. Alexander and Paul Nash; and plane table surveys of W. C. Spooner and Roy T. Hazzard; this field work supplied the necessary information for calculation of formation thicknesses along the lines of traverse.

In all cases, roads were surveyed with plane table or with Brunton Compass; except in those areas where U. S. G. S. topographic sheets were available.

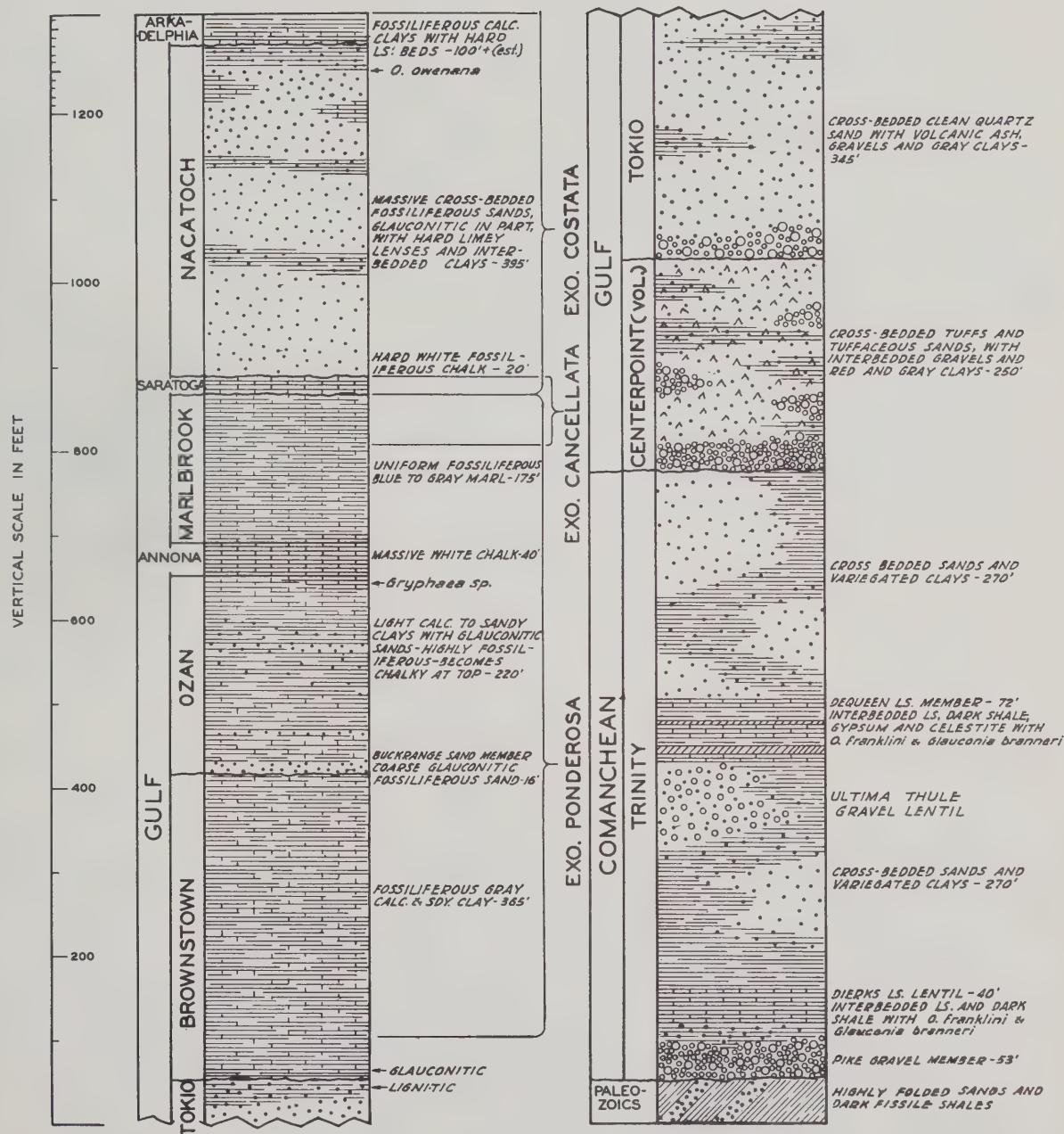
All publications related to the geology of Southwest Arkansas were freely drawn upon for information.

W. D. Frazell contributed information relative to favorable roads for bus travel; Everett Bradley typed and checked all papers in the guide book; T. L. Menge drafted a considerable number of the maps and charts.

There will be no specified time periods allotted for the stops. Since the area to be covered in the trip is relatively small, busses will be held at the stops as long as anyone wishes to study the outcrops or collect fossils.

GENERALIZED GEOLOGIC SECTION OF CRETACEOUS FORMATIONS - AT OUTCROP IN SOUTH-WEST ARKANSAS

SCALE - 1" = 200'



EXO. = EXOGYRA

FULTON-MCNAB SHEET

The first exposures to be seen north of Fulton are outcrops of the gray fossiliferous calcareous clays of the Arkadelphia formation. These outcrops may be noted in the drainage ditches on both sides of the road.

The regional strike of the Arkadelphia and Nacatoch formations on the Fulton-McNab sheet is N 73° E; the dip averages 70-75' per mile in a southeast direction. The thickness of the Arkadelphia is between 100 and 125 feet. Thickness of the Nacatoch Sand is 395 feet.

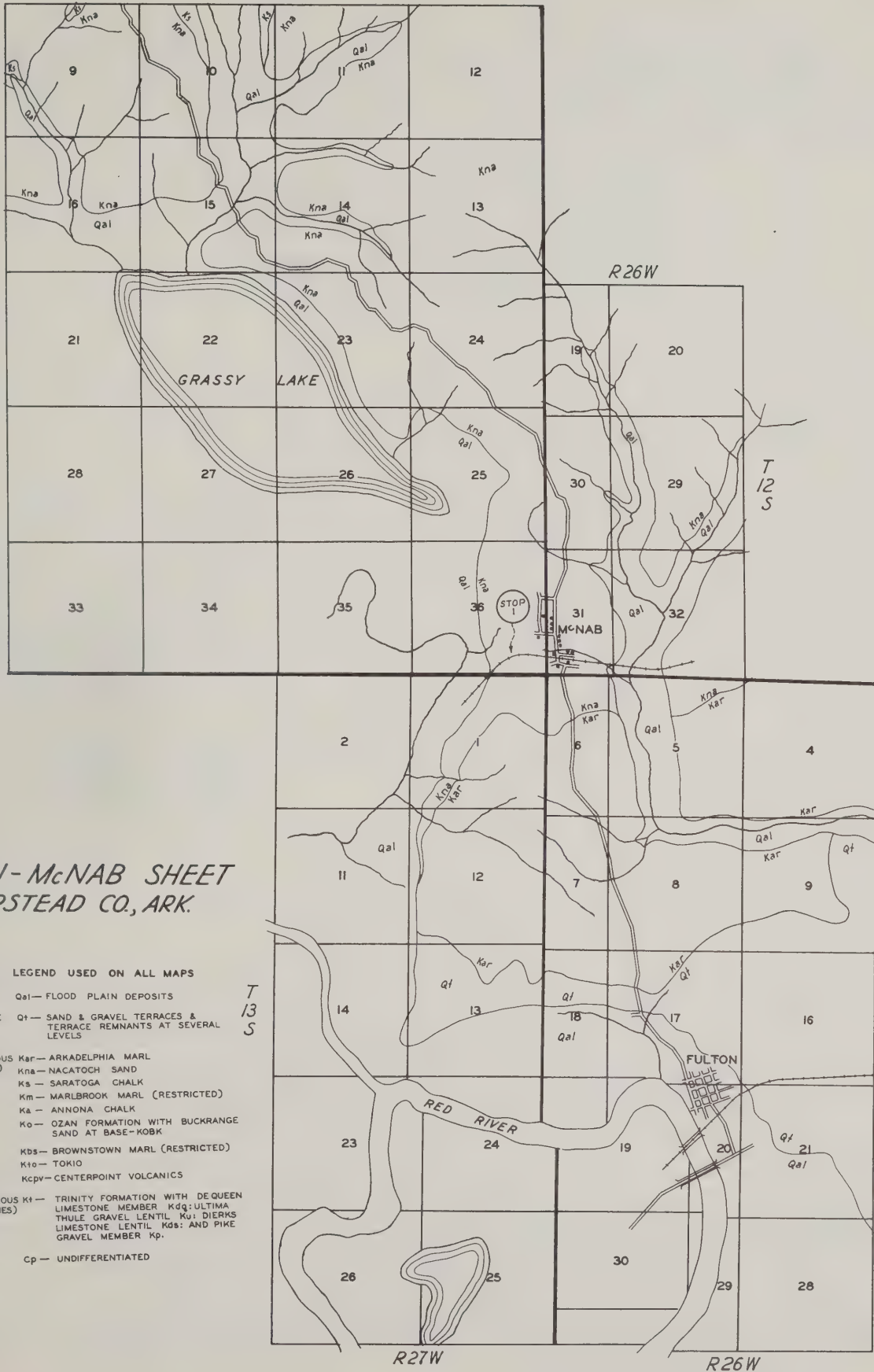
STOP NO. 1

The first stop will be made at McNab. The party will walk west through a cut along the railroad right-of-way where good exposures of the Nacatoch Sand may be seen. At the western end of the cut, about a quarter of a mile from the railroad station, fossiliferous limestone lenses are exposed at the top of a section of massive sandstone. Leaving the railroad right-of-way the party will walk southward for a quarter of a mile where the Arkadelphia-Nacatoch contact may be seen at the head of a deep gully. Fossiliferous shaly limestone here rests on sandstone and is overlain by dark fossiliferous marly clays. Specimens of Exogyra costata are easily collected. A short distance eastward from this locality, in a stream cut, Ostrea owenana and Gryphea vesicularis are present in abundance.

Dane's publication may be consulted for lists of Arkadelphia and Nacatoch fossils and other information regarding these formations.

A winding road will be followed northward from McNab to Saratoga. Many outcrops of the Nacatoch Sand may be noted. The base of the Nacatoch Sand is exposed on the Saratoga sheet.

R27W

T
12
S

FULTON-McNAB SHEET HEMPSTEAD CO., ARK.

FOLLOWING LEGEND USED ON ALL MAPS

- RECENT Qal— FLOOD PLAIN DEPOSITS
- PLEISTOCENE Ql— SAND & GRAVEL TERRACES & TERRACE REMNANTS AT SEVERAL LEVELS
- UPPER CRETACEOUS (GULF SERIES) Kar— ARKADELPHIA MARL
Kna— NACATOCH SAND
Ks— SARATOGA CHALK
Km— MARLBROOK MARL (RESTRICTED)
Ka— ANNONA CHALK
Ko— OZAN FORMATION WITH BUCKRANGE SAND AT BASE—KOBK
Kbs— BROWNSTOWN MARL (RESTRICTED)
Kio— TOKIO
Kcpv— CENTERPOINT VOLCANICS
- LOWER CRETACEOUS Kt— TRINITY FORMATION WITH DEQUEEN LIMESTONE MEMBER Kdq: ULTIMA THULE GRAVEL LENTIL Kds: AND PIKE GRAVEL MEMBER Kp.
- PALEOZOIC Cp— UNDIFFERENTIATED

T
13
ST
13
S

R27W

R26W

SARATOGA SHEET

The regional strike and dip of the formation exposed on the Saratoga Sheet closely approximates the values given for the Fulton-McNab Sheet. Following are average thicknesses of the formations exposed along the line of traverse followed by the highway from south to north:

Saratoga chalk	20 feet
Marlbrook marl	175 feet
Annona chalk	40 feet
Ozan formation (including Buckrange sand)	235 feet
Brownstown formation	365 feet

STOP NO. 1

A stop will be made at the town of Saratoga just beyond a right angle turn of the highway to the north; the section to be reviewed begins at the base of the Nacatoch sand and extends downward into the Annona chalk.

The Nacatoch-Saratoga contact is marked by an abrupt lithologic change, from massive, crossbedded, yellow sand to hard, white fossiliferous chalk. The contacts at both the top and the base of the Saratoga are disconformable according to Dane. Immediately underlying the Saratoga are the soft gray chalky shales of the Marlbrook. The part will walk north along the road, across the Marlbrook marl, to the first Annona chalk. The contact of the Marlbrook and Annona chalk is transitional; the Annona chalk is sparingly fossiliferous, as compared to the overlying formations. Note the *Exogyra* zones as indicated on the preceding columnar section. Following are lists of fossils:

Saratoga fossils

Inoceramus sp.
Gryphaea vesicularis
Exogyra costata
Exogyra cancellata

Marlbrook fossils

<i>Ostrea plumosa</i>	<i>Exogyra ponderosa</i>
<i>Ostrea panda</i>	<i>Anomia argentaria</i>
<i>Ostrea falcata</i>	<i>Parenomia scabra</i>
<i>Exogyra cancellata</i>	

A side trip to the Arkansas Portland Cement Company's plant may be made if sufficient time is available. This plant is located on the Annona chalk outcrop; Annona chalk is being stripped for use in the plant.

Ozan outcrops are poorly exposed north of the Annona chalk hills. Beyond the settlement of Tollette an exposure of the Buckrange Sand may be seen where its outcrop is crossed by the highway; a stop will not be made at this locality since a much better exposure on the Ben Lomond-Brownstown sheet will give opportunity for a view of the entire thickness of the Buckrange sand and of a portion of the Ozan beds above it.

STOP NO. 2

A good exposure of the Brownstown will be seen at this locality. Specimens of *Exogyra ponderosa* are very common. The Brownstown of this locality is approximately 20 feet stratigraphically below the base of the Buckrange sand.

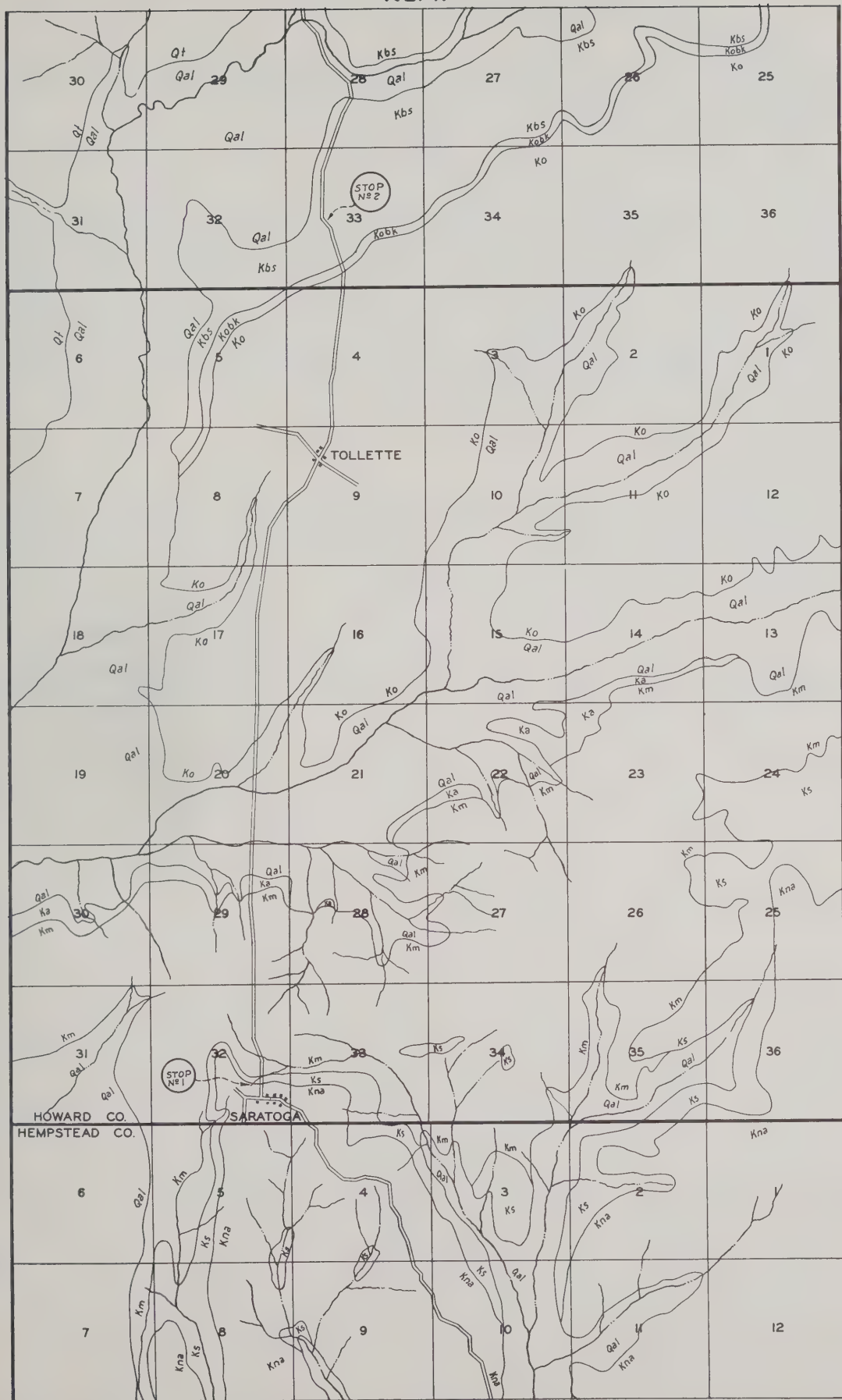
A complete section of the Brownstown will be seen on the Ben Lomond-Brownstown Sheet; the Tokio-Brownstown and Brownstown-Buckrange contacts may be studied at better localities on this sheet.

R27W

T
10
S

T
11
S

T
12
S



R27W

SARATOGA SHEET
HOWARD & HEMPSTEAD COUNTIES, ARK.
SCALE - 1 INCH = 1 MILE

MINERAL SPRINGS-NASHVILLE SHEET

From Mineral Springs to Nashville, no exposures of interest are to be seen along the highway since alluvium and Quaternary terrace deposits effectively cover the upper part of the Tokio.

STOP NO. 1

A short distance southeast of Nashville the contact of the Brownstown and Tokio is fairly well exposed. Here the Brownstown-Tokio contact is marked by an abrupt lithologic change. Dark fossiliferous clays, interbedded with slightly glauconitic and ferruginous sand streaks rest upon the light gray non-fossiliferous silty clays and claystones of the Tokio. The basal Brownstown clays contain a small Exogyra, the specific name of which is not known. The contact is more striking because of the abrupt lithologic and color change, a feature, which will not be seen at the Brownstown-Tokio contact on the Ben Lomond-Brownstown Sheet.

STOP NO. 2

The exposure at this locality, just west of the town of Nashville, shows a typical sandy phase of the Tokio. There are many good exposures of the Tokio along the road west from this stop, which will be seen from the busses on the second day's trip from Nashville to Lockesburg.

A north turn to Centerpoint will be made about a mile beyond STOP NO. 2.

The thickness of the Tokio exposed on the Mineral Springs-Nashville sheet averages 325 feet.

R28W

R27W

T 9 S

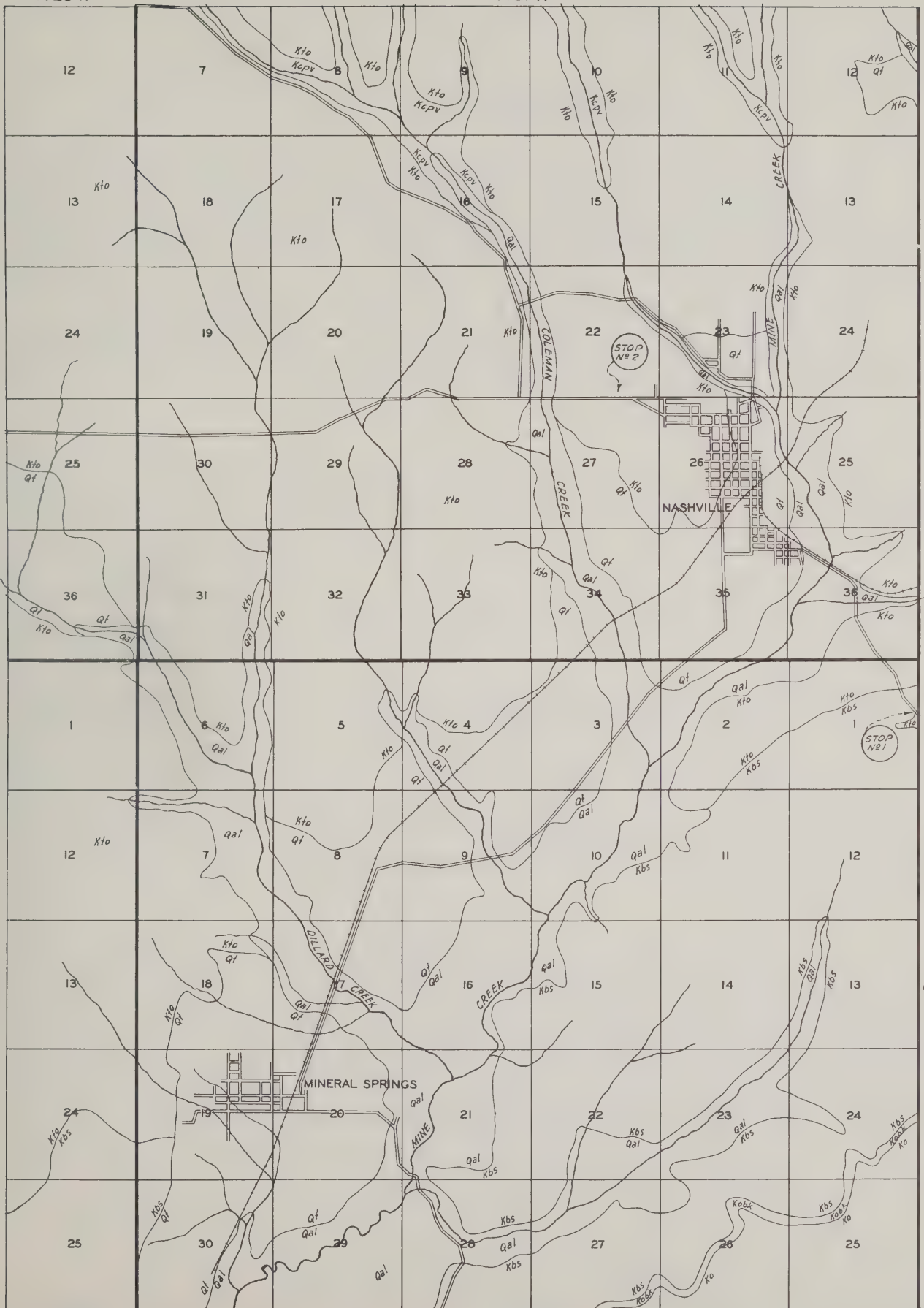
T 9 S

MINERAL SPRINGS - NASHVILLE SHEET

HOWARD CO., ARK.

T 10 S

T 10 S



R28W

R27W

CENTERPOINT-DIERKS SHEET

Beds of Tokio (Austin), Eagleford and Trinity ages are exposed on this sheet. The "Volcanic" Woodbine of Southwest Arkansas has been shown to be Eagleford in age (refer elsewhere in guide book). The name of "Centerpoint Volcanics" has been given to this very interesting rock sequence. The upper and lower contacts of this formation are exposed within short distances of the settlement of Centerpoint.

Along the line of traverse from a point north of Centerpoint, to Dierks, a 700 foot section of the Trinity may be seen in nearly continuous outcrops. On the Centerpoint-Dierks sheet the regional strike of the Trinity approximates N 70° E with a southward dip of 85 to 90 feet per mile.

STOP NO. 1

A good exposure of the basal gravels of the Centerpoint Volcanics may be seen at this stop; the exact contact with the underlying Trinity is not visible although it may be placed within a few feet. The sandstones and clays of the uppermost Trinity may be seen in a gully on the west side of the road.

The prominent hills visible in the distance are a part of the Ouachita Mountains, made up of folded rocks of paleozoic age.

STOP NO. 2

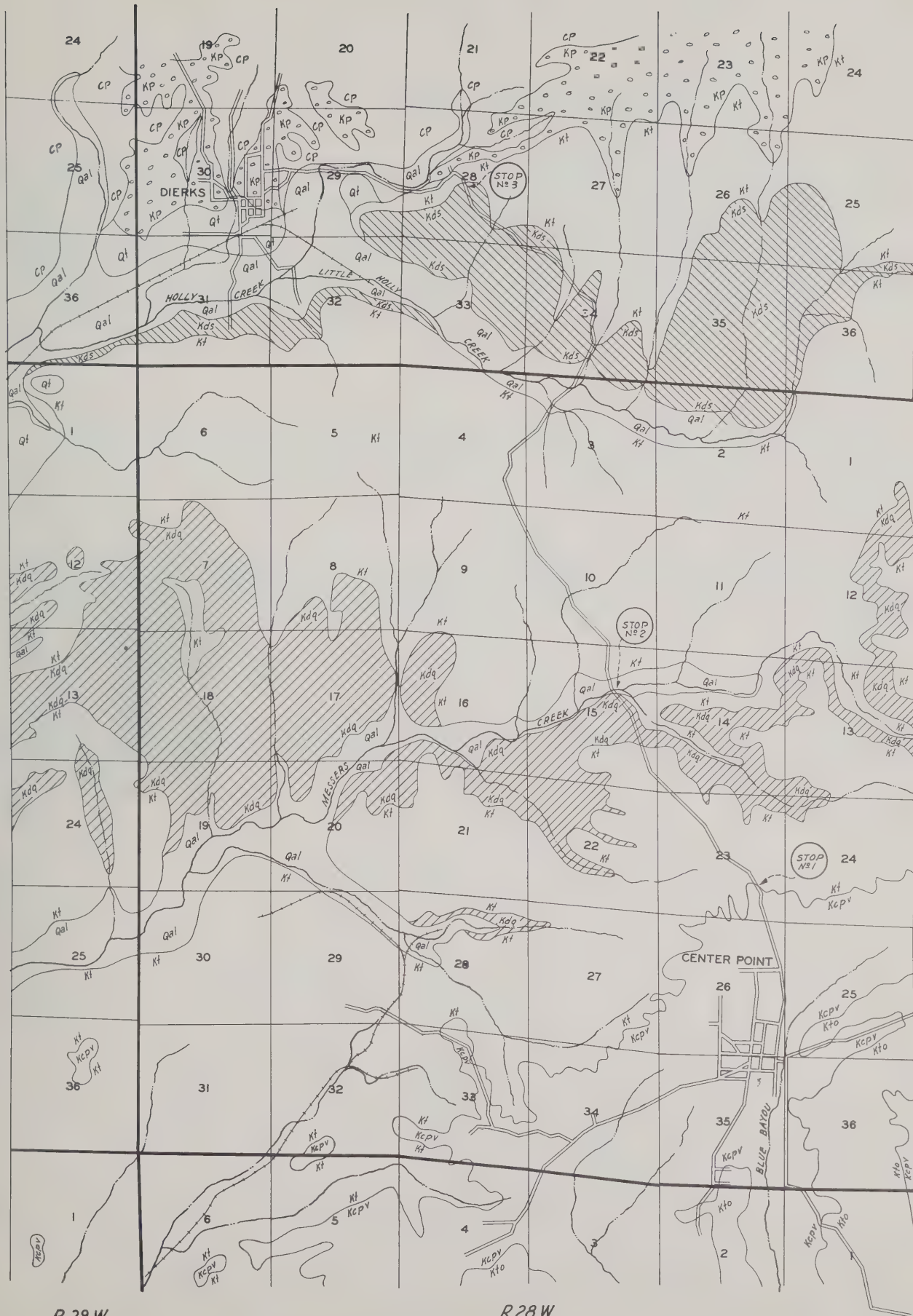
An outcrop of the De Queen limestone member of the Trinity located on the south bank of Messers Creek will be seen at this stop.

The De Queen limestone member is considered to be the surface equivalent of a part of the Upper Glen Rose formation and of the Glen Rose anhydrite of the Louisiana subsurface. Here there is exposed 70-75 feet of interbedded limestones, dark shales and gypsum. Fossils reported from the limestones are: Ostrea franklini; Anomia texana; Corbicula arkansaensis; Glauconia branneri.

STOP NO. 3

At this locality the basal portion of the Dierks limestone lentil is well exposed. It is fossiliferous with many of the same species reported in the De Queen limestone. The Dierks limestone is correlated with Young Zone of the Rodessa Field and with the James Zone of northeast Louisiana and south Arkansas. The party will walk northward along the road down a hill slope to a road intersection. In a deep gully on the south side of the road just beyond the intersection, the Pike Gravels may be observed. Across the creek bottom may be seen outcrops of the folded paleozoic rocks rising above the creek level.

R 28 W



R 28 W

SALINE RIVER SHEET

The thickness of the Centerpoint Volcanics, correlated with the Eagleford of Texas, by Roy T. Hazzard, varies from 200 to 250 feet within the area of outcrop covered by this sheet. The formation is made up of lithic tuffs, tuffaceous sands and gravels, with interbedded red and gray clays. The tuffaceous material is made up largely of small pellets of more or less weathered phonolite, locally however large percentages of the igneous material are believed to be altered from pumice. Igneous cobbles and pebbles of porphyritic texture are commonly found in the gravels. Some of these, unaltered in the center, are a trachyte porphyry.

STOP NO. 1

The Tokio-Centerpoint Volcanics contact at this locality is marked by a basal Tokio conglomerate, made up largely of novaculite pebbles, overlying the brownish-green tuffaceous sands of the Centerpoint Volcanics.

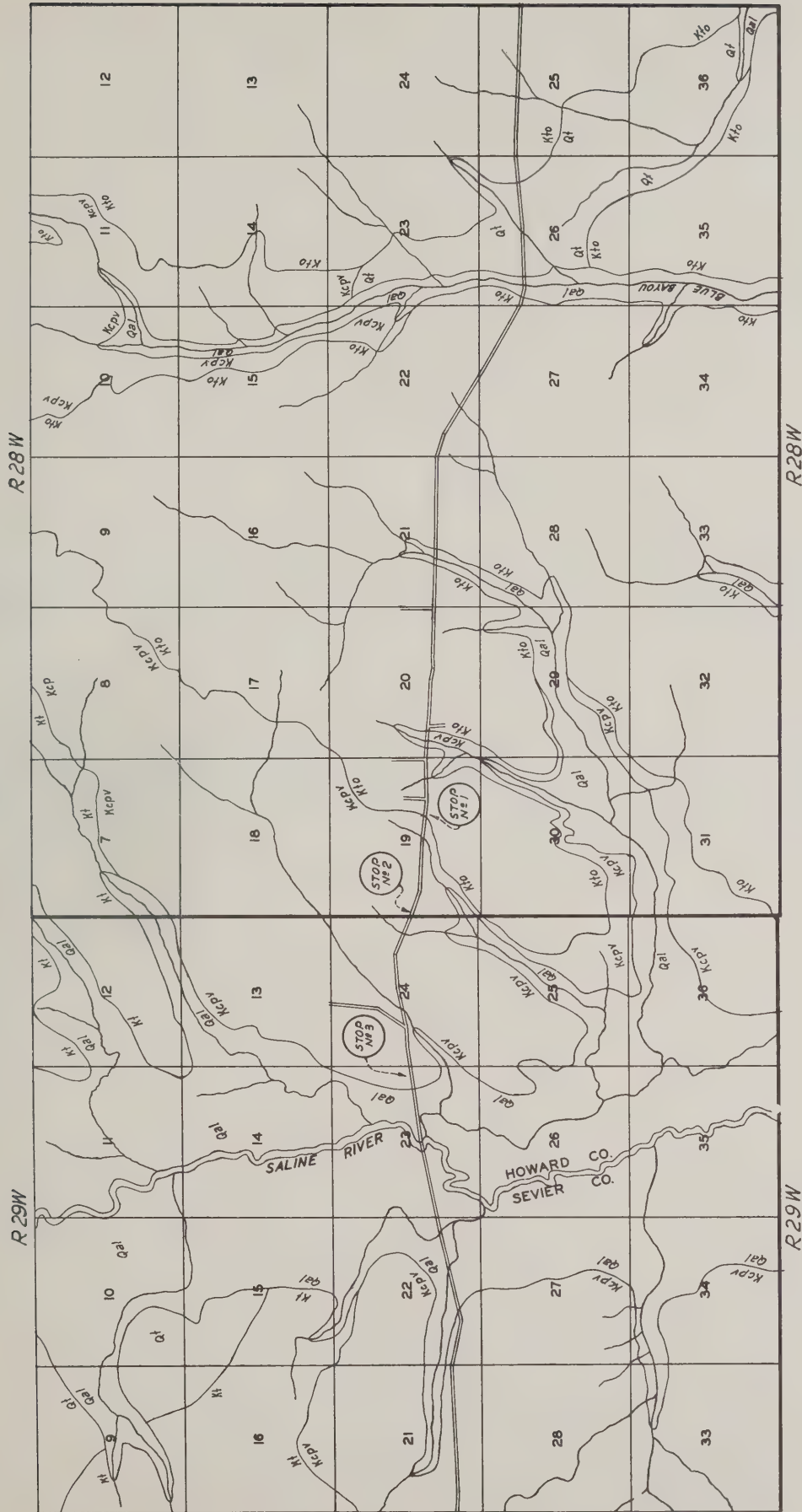
STOP NO. 2

This locality shows a typical clay section of the Centerpoint Volcanics. Most of the pebbles embedded in the clay are kaolinized trachyte porphyry. The exposures at this locality are 90 feet stratigraphically below the top of the formation.

STOP NO. 3

Approximately fifty feet of Centerpoint Volcanics are exposed in this road cut and in the ditch north of road. Note particularly the concretionary "cannon-ball" zone in the lower part of the exposure, and the interbedded red beds near the top of the road cut.

7 9 5



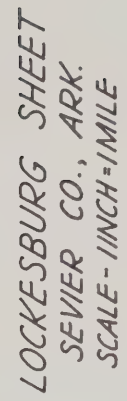
SALINE RIVER SHEET
HOWARD & SEVIER COUNTIES, ARK.
NASHVILLE TO LOCKESBURG

LOCKESBURG SHEET

West of the Saline River Valley, beyond Stop No. 3 of the Saline River Sheet, the road traverses diagonally across the outcrops of the Centerpoint Volcanics. Its contact with the Trinity occurs about a mile east of Lockesburg. A section of Massive Trinity sands will be noted just east of the town.

STOP NO. 1

At this locality the unconformity between the Upper and Lower Cretaceous is very apparent; with the basal gravels of the Centerpoint Volcanics resting on an irregular surface of the Trinity. Below the contact may be seen sands and clays distinctly different in lithologic character than the overlying gravelly volcanics.



105

HORATIO SHEET

Many typical exposures of both the Centerpoint Volcanics and the Trinity may be seen on the road from Lockesburg to Horatio, and on the road from De Queen to Horatio.

STOP NO. 1

At this locality there is an excellent exposure of the basal portion of the Centerpoint Volcanics. The concretionary nature of the "Cannon Ball" Zone is shown to advantage. The interbedded gravels contain many igneous pebbles, weathered almost to pure kaolin. In some, however, the phenocrysts of feldspar have retained their original form, and may be seen easily with the aid of a hand lens.

About 75 yards north of the bridge an excellent exposure may be seen in the creek bluff, of the Centerpoint Volcanics. Beds exposed here underlie the exposure of the highway cut. The bluff is on the west side of the creek--walk up stream on the east side for best view.

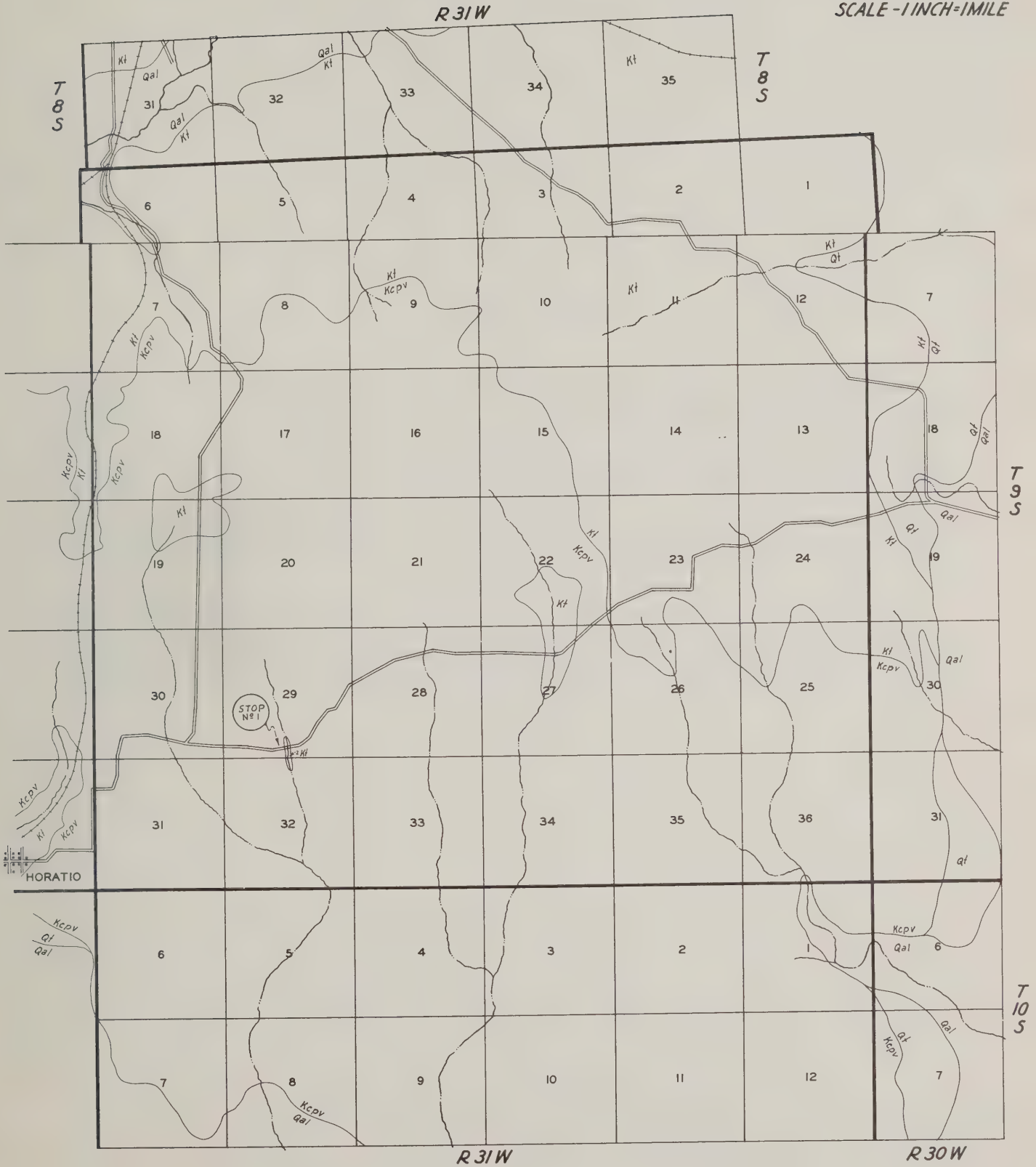
In the bed of the creek, south of the road a short distance, the contact of the Centerpoint Volcanics and the Trinity is exposed. Here a hard layer of conglomerate overlies the variegated Trinity clays.

SIDE TRIP FROM HORATIO TO CERRO GORDO

At Cerro Gordo the Centerpoint Volcanics rest on the Kiamichi (Upper Fredericksburg). Here the Kiamichi is made up of alternating fossiliferous limestones and marls, with an approximate thickness of 20' exposed. Gryphaea navia are abundant.

The Kiamichi rests on the Goodland limestone, which is at least 35 feet thick at this locality. The Goodland is a massive, gray, limestone. Fossils are abundant but poorly preserved. A marly clay observed at the base of the Goodland limestone, is thought by some to be the Walnut clay.

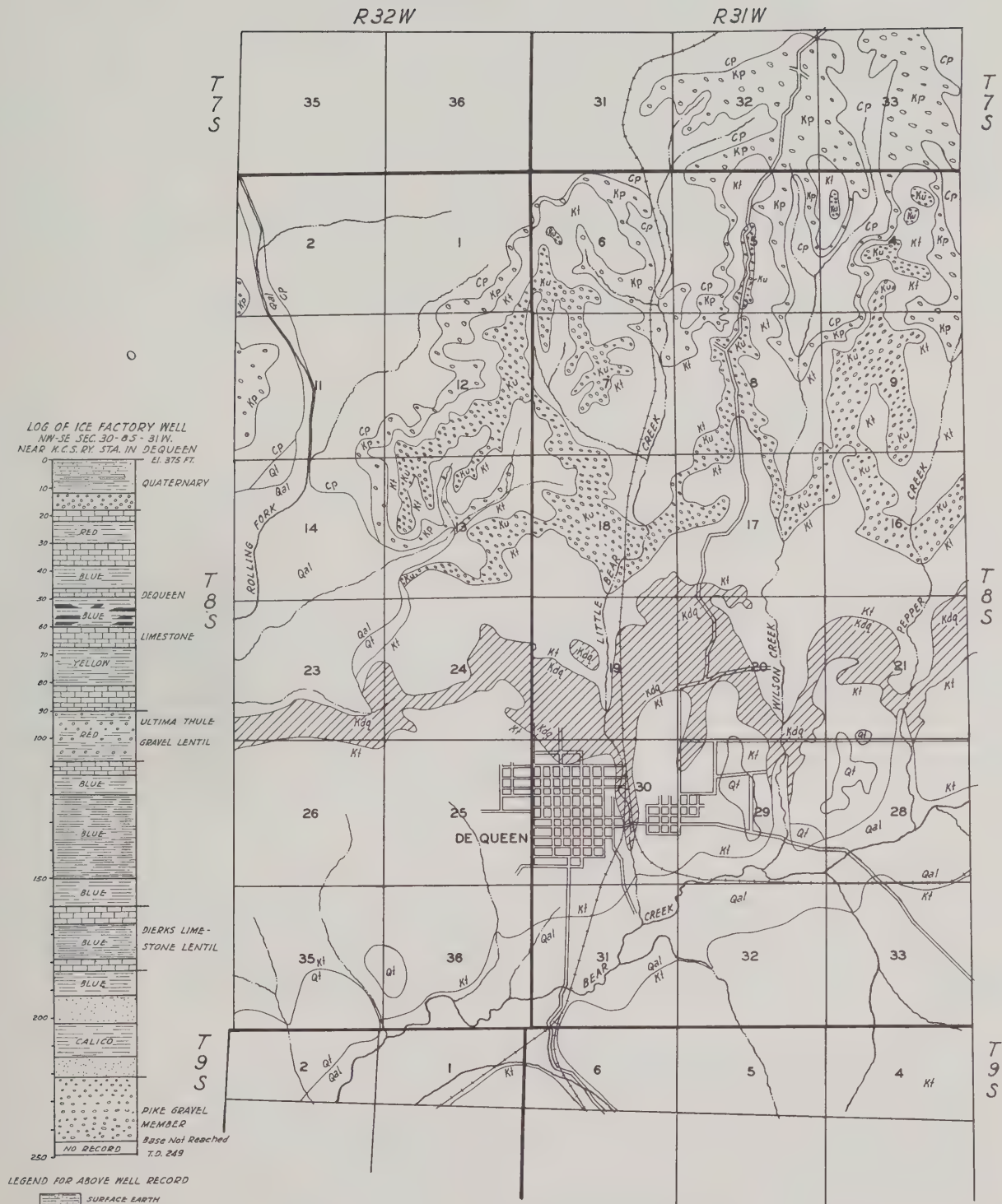
HORATIO SHEET
SEVIER CO., ARK.
SCALE - 1 INCH = 1 MILE



DE QUEEN SHEET

This part of the trip was included to show the relations of the different formations of the Trinity Group. The well log graphically shown on the De Queen Sheet gives an excellent picture of the stratigraphic sequence. The pre-Cretaceous erosion surface on which the Pike Gravels rest strikes roughly east and west in this area, and dips progressively steeper basinward from 60 to 160 feet per mile (after Spooner). This erosion surface, although minor irregularities exist, is essentially smooth, and marks a period of base levelling prior to the deposition of the Pike Gravels. Notice on the map the two separate gravel beds and the absence of the Dierks limestone lentil.

No stops are scheduled on the side trip to be made northward from De Queen. The busses will travel slowly so that the passengers may observe the De Queen limestone, the gravel beds and the sands and clays of the Trinity. Busses will turn back at a point about six miles north of De Queen and will retrace route.



BEN LOMOND-BROWNSTOWN SHEET

The road from Lockesburg to Ben Lomond traverses south and southeasterly across the Centerpoint Volcanics and the Tokio. The surface in part is covered by a mantle of Quaternary terrace gravels and sands. Beyond a sharp southeast bend in the road after passing through a small settlement, numerous exposures of dark bedded clay-shale will be noted in the road cuts. These are Tokio in age, and are correlated with the upper part of the Bonham Clay of northeast Texas.

Dr. C. I. Alexander and Paul Nash measured an overall thickness of 450 feet of the Tokio and Centerpoint Volcanics between Lockesburg and Ben Lomond.

The line of Alexander's cross section is shown on the Ben Lomond-Brownstown Sheet. His paper shows a detailed cross section, columnar section, and fossil check list for the Brownstown-Ozan and Annona chalk sections. A regional strike of N 76° E and a southeast dip at average rate of 65 feet per mile were determined by Alexander. Thicknesses of formations exposed between Ben Lomond and Chalk Cliffs are as follows:

Annona Chalk	40'+
Ozan including Buckrange sand ..	75-80'
Buckrange sand	20'
Brownstown	140'

It will be noted that these thicknesses are appreciably less than those along the traverse from Fulton to Dierks.

STOP NO. 1

At this locality the Tokio-Brownstown contact is marked by a lithologic change from sandy clay containing finely divided lignite to a somewhat less sandy clay carrying glauconite. The hard sand below the contact, with fossil casts, is probably close to true Blossom sand in age. Note the absence of Exogyra ponderosa in the basal Brownstown. Fossils reported from the Tokio are: Trigonarca sp; Inoceramus aff I. barabini; Corbula sp.

STOP NO. 2

At this locality, the exposed beds are about 50 feet higher stratigraphically than the Tokio-Brownstown contact; beds near the base of the Exogyra ponderosa zone occur here. The massive shells of this species characterize the geologic section from this point to the top of the Marlbrook. Exogyra ponderosa var. erraticostata, a highly costate type, is, so far as known, restricted to the Brownstown marl.

BROWNSTOWN FOSSILS

<u>Hamulus major</u>	<u>Paranomia scabra</u>
<u>Hamulus onyx</u>	<u>Anomia argenteria</u>
<u>Ostrea plumosa</u>	<u>Turritella</u> sp.
<u>Gryphae vesicularis</u>	<u>Baculites</u> sp.
<u>Exogyra ponderosa</u>	<u>Scaphites</u> sp.
<u>Exogyra ponderosa</u> var. <u>erraticostata</u>	<u>Shark teeth</u>

STOP NO. 3

The Buckrange sand member of the Ozan is a gray, fossiliferous, medium-

grained, glauconitic sand containing varying amounts of clay and with scattered well rounded and smooth pebbles throughout. The contact with the underlying Brownstown shows irregularities of as much as three inches vertically within distances of less than a foot horizontally. Two hundred feet up the road, toward the school house, the top of the Buckrange sand is exposed, where it is gradually transitional into chalky clays of the Ozan formation.

The disconformable contact at the base of the Buckrange sand represents a hiatus, probably marginal in character. It is reported by Dr. Alexander and Merle C. Israelsky that the transitional beds from Ozan into Brownstown have been found in Texas on the surface, and in the subsurface formations of Sabine Parish, Louisiana. In southern Arkansas, the micro-fauna above and below the Buckrange-Brownstown contact are sufficiently contrasted to warrant the placing of a hiatus at this contact, the physical evidence of which is visible at this locality.

OZAN FOSSILS

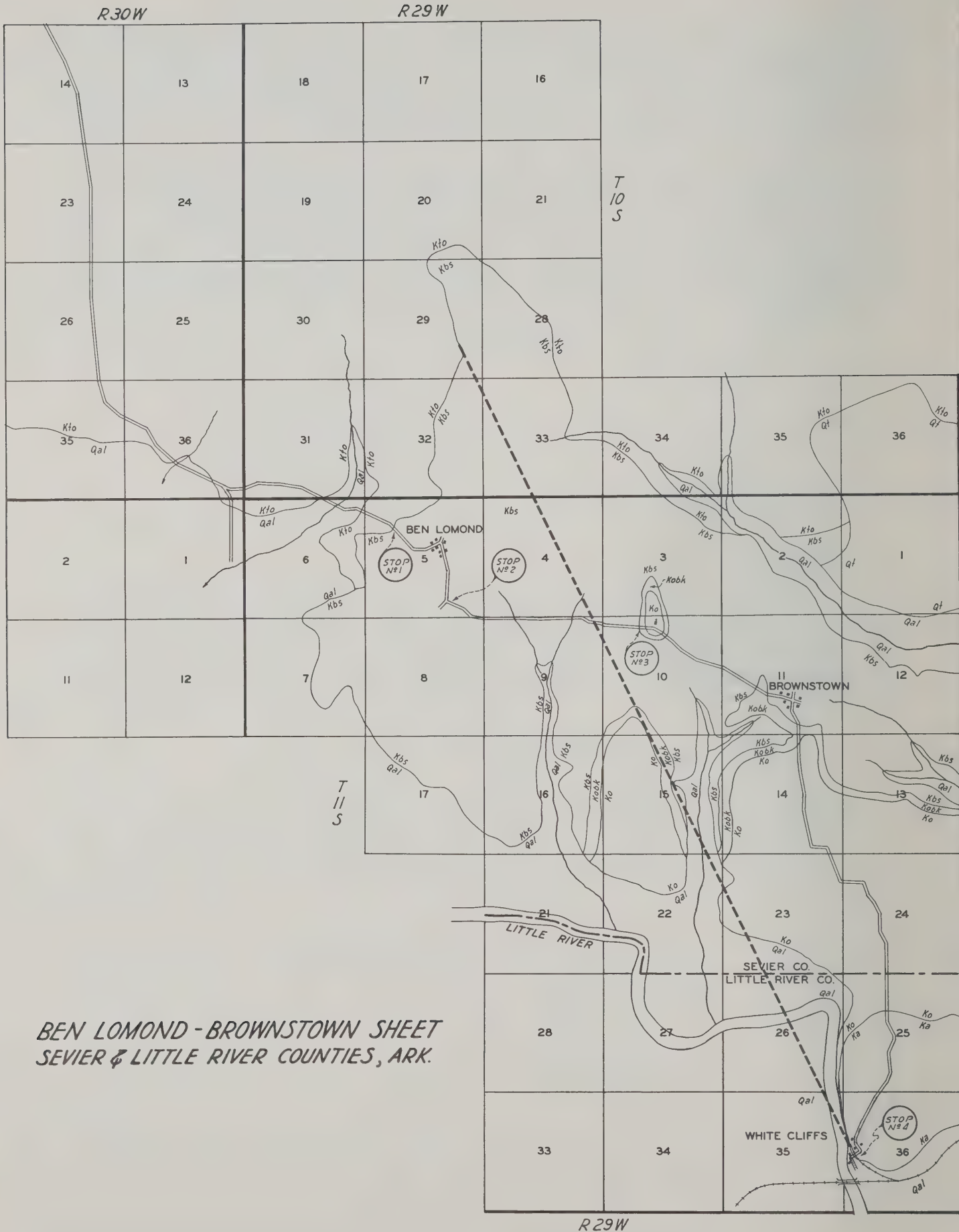
<i>Ostrea panda</i>	<i>Liopistha alternata</i>
<i>Ostrea falcata</i>	<i>Clavagella armata</i>
<i>Ostrea plumosa</i>	<i>Turritella</i> sp.
<i>Gryphea</i> sp.	<i>Baculites</i> sp.
<i>Exogyra ponderosa</i>	<i>Placenticeras</i> sp.
<i>Pecten</i> sp.	<i>Pachydiscus</i> sp. (?)
<i>Anomia argentaria</i>	Shark teeth
<i>Paranomia scabra</i>	

STOP NO. 4

An excellent opportunity for studying the Annona chalk is afforded by exposures in the quarry at White Cliffs. The Ozan-Annona contact is exposed on the chalk bluff about a quarter of a mile up the river from the quarry. Here, the dense white chalk of the Annona overlies a sequence of chalk and chalky marls of Ozan age in which great numbers of a smooth, convex species of *Gryphea* are present.

ANNONA FOSSILS

<i>Echinocorys</i> cf. <i>E. texana</i>	<i>Trigonia</i> sp.
<i>Inoceramus</i> aff. <i>I. barabini</i>	<i>Veniella</i> sp.
<i>Ostrea plumosa</i>	<i>Pecten</i> sp.
<i>Ostrea panda</i>	<i>Actaeon</i> sp.
<i>Ostrea falcata</i>	<i>Baculites</i>



BEN LOMOND - BROWNSTOWN SHEET
SEVIER & LITTLE RIVER COUNTIES, ARK.

TABLE OF CONTENTS

<u>TITLE</u>	<u>PAGE</u>
Foreword by C. L. Moody	4
Pine Island Oil Field, Caddo Parish, La. by A. F. Crider	6
Magnolia Pool, Columbia, Co., Ark. by H. H. Trager	14
Atlanta Field, Columbia Co., Ark. by K. A. Schmidt, Weldon Cartwright and E. B. Stiles	16
Cotton Valley Field, Webster Parish, La. by C. L. Moody and J. D. Moody ...	18
Schuler Pool, Union Co., Ark. by Warren B. Weeks	24
Snow Hill Pool, Ouachita Co., Ark. by Warren B. Weeks	28
Diagnostic Fossils of the Ark-La-Tex Area With Fossil Plates and Explanations by L. W. Calahan	36
Rodessa Field, Caddo Parish, La., Cass and Marion Counties, Texas, Miller County, Ark. by C. C. Clark	59
Common and Significant Species of Foraminifera and Ostracoda of the Brownstown, Ozan and Annona Formations of Southwestern Arkansas by C. I. Alexander	64
Development in Southern Arkansas and Louisiana in 1938 by W. C. Spooner ...	71
Stamps Field, Lafayette Co., Ark. by C. L. Morgan	80
Oil Fields of North Louisiana and South Arkansas; Compiled by A. M. Lloyd and B. W. Blanpied	85
North-South Cross Section from the Paleozoic Outcrops in Howard, Co., Ark. to Beauregard Parish, La. by A. M. Lloyd and Roy T. Hazzard	89
Northeast-Southwest Cross Section from Dallas Co., Ark. to Rusk Co., Texas by Roy T. Hazzard and A. M. Lloyd	92
Geology and Development of the Buckner Pool, Columbia and Lafayette Counties, Ark. by W. K. Link	96
Geology and Development of the Village Pool, Columbia Co., Ark. by W. K. Link	100
Deep Drilling Practices in Southwest Arkansas by L. M. Crow	105
Northeast-Southwest Cross Section, Cleveland County, Ark. to Webster Parish, La. by Joseph Purzer	114
The Shreveport Oil Field, Caddo Parish, La. by S. E. Mix and J. T. McGlothlin	118

Garland City Pool, Miller Co., Ark. by L. R. McFarland	123
Tentative Correlation Charts of the Gulf Coast Mesozoic and Cenozoic Systems Compiled by B. W. Blanpied and Roy T. Hazzard	125
Deep Development in the Shongaloo Pool, Webster Parish, La. by Everett Eaves	129
The Centerpoint Volcanics of Southwest Arkansas; A facies of the Eagleford of Northeast Texas, by Roy T. Hazzard	133
Notes on the Comanche and Pre-Comanche ? Mesozoic Formations of the Ark-La-Tex Area and a Suggested Correlation with Northern Mexico, by Roy T. Hazzard	155
Bibliography of Publications Related to the Geology of the Ark-La-Tex Area, Compiled by B. W. Blanpied	179
Index Map Ark-La-Tex Area	190
Introduction: Shreveport Geological Society's Fourteenth Annual Field Trip.	191
Generalized Geological Section of Cretaceous Formations at Outcrops in Southwest Arkansas	192
Route Maps and Stops	193-211

INDEX TO ADVERTISERS

	Page
A	
Arkansas Portland Cement Company, Little Rock, Ark.....	94
Arkmo Lumber Company, Shreveport, La.....	22
Arlington Hotel, Hot Springs, Ark.....	99
B	
Baker Oil Tools, Inc., Houston, Tex.....	32
Baroid Sales Dept., Nat'l Lead Co., Los Angeles, Calif.....	68
W. M. Barret, Inc., Consulting Geophysicists, Shreveport, La.....	132
M. L. Bath Company, Ltd., Shreveport, La.....	121
Big West Drilling Company, Dallas, Tex.....	95
The Brewster Company, Inc., Shreveport, La.....	152
F. H. Brown, Inc., Shreveport, La.....	35
C	
Citizens Bank, Magnolia, Ark.....	83
Columbia Restaurant, Shreveport, La.....	91
Columbia County Abstract Company, Magnolia, Ark.....	12
Core Laboratories, Inc., Dallas, Tex.....	31
Craig Builders Supply Company, Magnolia, Ark.....	99
Crescent Drilling Company, Monroe, La.....	87
A. F. Crider, Shreveport, La.....	153
D	
Dowell, Inc., Tulsa, Okla.....	57
Ralph Dudley, Magnolia, Ark.....	12
E	
Eby Engineering Company, El Dorado, Ark.....	87
El Dorado Lumber Company, El Dorado, Ark.....	103
F	
Firestone Auto Supply & Service Stores, Shreveport, La.....	91
First National Bank, El Dorado, Ark.....	70
G	
Geophysical Service, Inc., Dallas, Tex.....	2-3
The Garrett Hotel, El Dorado, Ark.....	94
Grim Hotel, Texarkana, Ark.....	57
H	
Halliburton Oil Well Cementing Company, Duncan, Okla.....	122
Heiland Research Corporation, Denver, Colo.....	154
Hughes Tool Company, Houston, Tex.....	34-34a
L	
Lane-Wells Company, Los Angeles, Calif.....	32
Lion Oil Refining Company, El Dorado, Ark.....	88
Love-Owen, Leases & Royalties, Magnolia, Ark.....	83

M

Magnolia Chamber of Commerce, Magnolia, Ark.....	13
F. W. Martin & Company, Shreveport, La.....	104
Mid-Continent Supply Company, Shreveport, La. & Ft. Worth, Tex.....	127

N

The National Supply Company, Ft. Worth, Tex.....	84
National Tank Company, Tulsa, Okla.....	33

P

Pelican Well Tool & Supply Company, Shreveport, La.....	112
---	-----

R

W. G. Ray Drilling Company, Inc., Shreveport, La.....	11
Reed Roller Bit Company, Houston, Tex.....	78
J. I. Roberts Drilling Company, Shreveport, La.....	69

S

Schlumberger Well Surveying Corporation, Houston, Tex.....	58
Security Abstract Company, El Dorado, Ark.....	69
The Shreveport Journal, Shreveport, La.....	117
Shreveport Photo Copy Company, Shreveport, La.....	111
Simmons Building Material Company, Shreveport, La.....	121
W. Holmes Smith, Shreveport, La.....	35
W. C. Spooner, Shreveport, La.....	153
Stamps, Arkansas	79
Sultana Drilling Company, Inc., Shreveport, La.....	23
Superior Iron Works & Supply Company, Shreveport, La.....	131

T

Thornhill-Graver Company, Inc., Houston, Tex.....	111
---	-----

V

G. H. Vaughn, Dallas, Tex.....	95
--------------------------------	----

W

Waldo, Arkansas	113
-----------------------	-----

Y

Yarbrough Guns Company, El Dorado, Ark.....	103
---	-----

The Field Trip Committee of the Shreveport Geological Society wishes to take this opportunity to thank the management of the following Companies and Independents for their cooperation in permitting their employees to prepare this worthwhile contribution to the science of Geology:

THE ATLANTIC REFINING COMPANY
CROW DRILLING COMPANY
GULF REFINING COMPANY
LION OIL REFINING COMPANY
MAGNOLIA PETROLEUM COMPANY
THE OHIO OIL COMPANY
OLIPHANT OIL CORPORATION
PHILLIPS PETROLEUM COMPANY
STANDARD OIL COMPANY OF LOUISIANA
SUN OIL COMPANY
THE TEXAS COMPANY
TIDE WATER ASSOCIATED OIL COMPANY
UNION PRODUCING COMPANY
A. F. CRIDER
W. C. SPOONER

AND ALL INDIVIDUALS WHO HAVE HELPED IN MAKING
THIS TRIP A SUCCESS.

"PLASTIC" BINDING
U. S. Patent No. 1970285
License No. 55

UNIVERSITY OF ILLINOIS-URBANA
C001
557XS
GUIDE BOOK OF THE SPRING FIELD TRIP SHRE
1939



3 0112 105210915